ISSN 0253-4924

FOOD TECHNOLOGY *Abstracts*

Vol. 28 No. 8 August 1993

Central Food Technological Research Institute, Mysore
National Information System for Science and Technology
Department of Scientific and Industrial Research, New Delhi.

NATIONAL INFORMATION CENTRE FOR FOOD SCIENCE AND TECHNOLOGY

CFTRI, MYSORE - 570 013

The National Information Centre for Food Science and Technology (NICFOS), is a discipline oriented information service in Food Science, Technology and Nutrition. Set up in October 1977 at the Central Food Technological Research Institute (CFTRI), Mysore, it is one of the Sectoral Information Centres under the NISSAT of the Govt. of India, Dept. of Scientific and Industrial Research.

NICFOS's services are generated by a band of professional specialists and backed up by reprographic, micrographic, printing and computer facility. Its services include publication of R & D and industry oriented current awarness services, answering technical inquries, reprography and training.

NICFOS BASE

The well-equipped Library of CFTRI with its collection going back to 1950 function as a clearing house for information on all aspects of food area. With its large collection of books, monographs, conference proceedings, bound volumes of periodicals, standards, patents, reports, theses, microforms and 600 current periodicals it can provide you with the latest information on any subject area of food. The library also serves as a training centre in different aspects of information handling and use besides guiding in setting up of new libraries in the area of food science and technology.

PHOTOCOPY (XEROX) OF PUBLISHED SCIENTIFIC/TECHNICAL ARTICLES

The National Information Centre for Food Science and Technology (NICFOS) at the Central Food Technological Research Institute, Mysore, has got a good collection of scientific and other periodicals collected over the years in the area of Biological Sciences. If any article is needed for reference work, we will supply one copy from our wealth of collections. The cost of providing the copies is Rs.2/- per page (minimum charge Rs.10.00). Please take advantage of this facility to overcome your problem in getting original articles.

All correspondences regarding these services should be addressed to:

The Head

FOSTIS, CFTRI,

Mysore 570 013,

Karnataka, India.

FOOD TECHNOLOGY ABSTRACTS

Vol. 28 No. 8
August 1993

National Information Centre For Food Science And Technology
Central Food Technological Research Institute,
Mysore - 570 013, India

Compiled and Edited by

B. Vasu

C. S. Anita

Geetha Seetharam

Abstractors to FTA

AA	Author's Abstract
BV	B. Vasu
CSA	C. S. Anita
GS	Geetha Seetharam
KAR	K. A. Ranganath
SD	S. Dhanaraj
SRA	S. R. Ananthnarayan
VKR	V. Krishnaswamy Rao

Computerisation and Database Creation

P. Manilal

C. S. Anita

B. Vasu

S. R. Ananthnarayan

Annual Subscription : Rs.250.00. US $ 85.00. Single Copy : Rs.25.00

FOOD TECHNOLOGY ABSTRACTS

Vol. 28, No. 8, 1993

CONTENTS

ABBREVIATIONS

A	ampere
AAS	atomic absorption spectrometry
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
°C	degree centigrade
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetraaceti acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gr	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 1]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short tim
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcalk, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, etc
N	Normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	Poise
p	probability
Pa	pascal (N/M^2)
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro–[as in g, μm]
%	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

ABBREVIATIONS FOR LANGUAGES

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	Es
Swedish	Sv

GENERAL

1605

Dautil (EN). **Studies of fruits and vegetables processing and marketing in the Philippines.** *Indian Food Packer* 47(2): 1993: 15-22

Strategies to improve the yield, and quality of fruit and vegetable crops required by the consumer market and food processing industries in Philippines are described. Steps to strengthen the infrastructure of production, processing and marketing; man power training on agro-industry project management are discussed. Production and consumption figures of banana, mango and pineapple, vegetables, coconut and its products are given in tables. GS

1606

Shaw (A), Mathur (P) and Mehrotra (NN). **A study of consumers' attitude towards processed foods.** *Indian Food Packer* 47(2): 1993: 29-41

Consumption pattern of processed foods and consumer's attitudes and perceptions towards processed foods are studied. The reasons for changing trends in the use of processed foods, factors influencing buying decision; qualities of the product preferred by consumers; sources of information for a new product; awareness about use of chemicals in processing of food and consumers' feeling about effect of chemicals, health effects of using excess processed foods, monthly income and expenditure on food and on processed foods are analysed. GS

FOOD PROCESSING

1607

Giese (J). **Advances in microwave food processing.** *Food Technology* 46(9): 1992: 118-123

Aspects dealt in this article are the basic principles of microwave food processing; dielectric properties of foods; physical factors of foods (specific heat, shape, surface area and temp.) that determine microwave penetration, overall heating rate and conventional heat transfer; applications of microwave in food processing such as tempering of frozen foods, drying, cooking, enzyme inactivation, baking, sterilization and pasteurization. CSA

1608

Cheftel (JC), Kitagawa (M) and Queguiner (C). **New protein texturization processes by extrusion cooking at high moisture levels.** *Food Reviews International* 8(2): 1992: 235-275

Gelation and fiber formation using vegetable proteins, texturization and fiber formation with fish muscle proteins, formation of multilayer, fibrous protein structures: possible mechanisms and research perspectives (the protein "plastification" phenomenon, extrusion stability, formation of fibrous and/or multilayer structures within long cooking dies), restructuring of mechanically deboned meat by extrusion cooking with binders, emulsification-gelation or "microcoagulation" of dairy proteins (processed cheeses, cheese analogs, fat substitutes, casein coagulation) are the aspects covered in this review. 49 references. SRA

FOOD PACKAGING

1609

Ramshaw (C). **Food packaging for microwaves.** *Packaging India* 25(2): 1992: 15-17, 19, 20

This paper firstly concentrates on the use of all plastic lidding laminates for shelf stable meals, suitable for retort and microwave use and secondly discusses the growing use of susceptor materials which improve the cooking of food in the microwave, resulting in the crisping and browning of such products as pastry, bread and pizza. CSA

1610

Mokashi (NG). **Packaging options available for fresh and processed foods.** *Packaging India* 25(2): 1992: 25, 27, 29, 31

Latest developments in food packaging systems which consists of composite cans, multilayer films and sheets, thermoform film seal systems, form fill seal machine, portion packs, bag-in-box, lined cartons, coated cartons, controlled atm. packaging, modified atm. packaging, retortable flexible pouch and microwave ovenable packaging used in the packaging of various food products such as meat, poultry, fish, fruits and vegetables, dairy products, cheese, ice cream, processed foods, canned foods, frozen foods, dry foods, candy and beverages are discussed in this article. CSA

1611

Sucheta (B). **PET and its application in food packaging.** *Packaging India* 25(2): 1992: 33-37

The application of PET in printing, laminating, heat sealing and bag making, automatic packaging, metallization and stretch blow moulding; the two stage process of making PET bottles, its advantages

and limitations as well as the salient features (hygiene, taste, clarity, vol./wt., safety, resonance, conservation, production, sales and closure integrity) of stretch PET bottles is dealt in this article. A comparison of different properties of HDPE, PVC and PET is also presented in a table. CSA

1612
Sucheta (B) and Jain (YD). **Lined cartons.** *Packaging India* 25(5): 1993: 37, 39, 41

Aspects covered in this article are the advantages of system packaging which involves the packaging material and the packaging machine, the use of LDPE by extrusion as liner for cartons, types of lined cartons (CEKATAINER, HERMETET, EXPRESSO), its application in the packing of teas, spices, cheese, vegetable oils etc, the advantages of lined cartons and the quality control tests on lined cartons. CSA

Aseptic packaging

1613
Gupta (HK). **Aseptic packaging of liquid foods.** *Indian Food Packer* 47(4): 1993: 23-28

Tetra aseptic cartons made from paper, polyethylene and Al preserve perishable liquid food products like milk, skim milk, cream, ice cream mix, puddings, desserts, sauces, gravies, yoghurts, cultured milk products, fruits and vegetable pulps, puree and conc., fruit juices, animals foods, soya foods, syrups, mineral water and wine as non-refrigerated storage. Other advantages are retention of nutrients and flavour: cost saving due to reduced energy consumption: consumer convenience in terms of package carrying wt., non-fragile containers, and easy to open and dispose. GS

Packaging materials

Plastics

1614
Baldev Raj, Vijayalakshmi (NS) and Ravi (P). **Problems of plastics contamination in foods.** *Packaging India* 25(2): 1992: 5, 7, 9, 11, 13, 14

Different commercial plastic materials and methods (extraction cell method for single films, pouch method and container method) intended for or used in various food packaging applications in our country are assessed in this article for the extent of migration of additives by global migration tests and the results are reported in terms of overall migration values. Also presented is the market survey on different coloured plastic containers being sold in local market for several brands of oils and vanaspati carried out to observe the migration of colour from plastic materials to the oils and fats. CSA

FOOD ENGINEERING AND EQUIPMENT

1615
Gratzek (JP) and Toledo (RT). **Solid food thermal conductivity determination at high temperatures.** *Journal of Food Science* 58(4): 1993: 908-913

Thermal conductivity of carrots and potatoes was measured using a line heat source probe adapted for measurements to 130°C. Fastest response and rapid attainment of linearity in temp. rise vs ln time plots, were obtained with a silicone oil-filled probe with an uninsulated thermocouple junction. Custom designed electronics to amplify thermocouple output, and computer control of measurements, data acquisition and analysis resulted in 0.4% data repeatability (two standard deviations) for calibration standards. Thermal conductivity of carrot and potato vs temp. agreed well with the published vol. fraction model for multi-components foods. AA

1616
Aimonacid-Merino (SF), Thomas (DR) and Torres (JA). **Numerical and statistical methodology to analyze microbial spoilage of refrigerated solid foods exposed to temperature abuse.** *Journal of Food Science* 58(4): 1993: 914-920

Numerical and statistical procedures based on pseudo-zero for the lag and first order reaction kinetics for the exponential growth phase were developed to analyze non-isothermal microbial spoilage. Arrhenius model parameters and their accuracy were estimated for a mixture of *Pseudomonas fluorescens*, *Staphylococcus aureus* and *Achromobacter lwoffi* growing in a seafood model. Linear regressions used with isothermal experiments generated initial values for nonlinear estimations of the frequency (K_o) and activiation energy (E_a) constants. An optimization technique was used to minimize the square difference between experimental and estimated values while parameter accuracy was assessed using a bootstrap method. E_a and $\ln(K_o)$ were 109 plus or minus 3.4 and 48.3 plus or minus 1.5 kJ/mole for the exponential, and 152 plus or minus 4.0 and 64.4 plus or minus 1.7 kJ/mole for the lag phase, respectively. The Mann-Whiteney-Wilcoxon rank sum test showed no significant differences between parameters generated by two different temp. profiles (5% significance level). AA

1617

Ramaswamy (HS) and Pillet-Nill (T). **Temperature distribution in microwave-heated food models.** *Journal of Food Quality* 15(6): 1992: 435-448

Temp. distribution during microwave reheating of starch gel (10%) in family-serving size microwavable dishes, spaghetti with meat sauce and rice-salmon with white sauce. The temp. distribution in all the samples was uneven, corners registering close to boiling temp. and interior locations below 50°C. Prolonged full power heating with lid on or heating at lower levels normalized the heat distribution. SD

1618

Zuckerman (H) and Miltz (J). **Characterization of this layer susceptors for the microwave oven.** *Journal of Food Processing Preservation* 16(3): 1992: 193-204

Three thin layer susceptors of 3 different optical densities (OD) tested showed that OD = 0.30 susceptor absorbed more of the incident microwave energy (40%) than the other two OD = 0.25 and OD = 0.35 susceptors. The mismatch between the intrinsic impedence of the sesceptor and that of air being a good criterion for the heating capability indicated that the lower the mismatch better is the heating. SD

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

1619

Tseng (DJ), Mathews (RF), Gregory (JFIII), Wei (CI) and Littell (RC). **Sorption of ethyl butyrate and octanal constitutents of orange essence by polymeric adsorbents.** *Journal of Food Science* 58(4): 1993: 801-804

Commercially available polymeric adsorbents (XAD-4, XAD-7, XAD-16, Duilite ES-865, Duolite S-761, Porapak-Q and XUS-43436) for sorption rates and capacities for two major aqueous orange essence components (ethyl butyrate and octanal) from model sol. were evaluated. The capacity of XAD-16 for ethyl butyrate in the column system was 426 plus or minus 12 mg/g. There was no column breakthrough for octanal even after 130 bed vol. 91.4% of the adsorbed ethyl butyrate was eluted from XAD-16 resin by 95% ethanol elution. Recovery of adsorbed octanol from the resin was 66.4%. GS

1620

Sayler (DF) and Geiger (PJ). **Extraction and analysis of metabolic phosphates in plants.** *Journal of Food Science* 58(4): 1993: 890-892

A method for extraction and simultaneous detection and quantification of nucleotides and other phosphate compounds in vegetable tissues. 19 organic phosphate compounds were detected with the automated phosphate analyzer, utilizing perchloric acid extracts of peas (fresh and frozen), tomatoes and other plant tissues. This method is useful in studying changes such as maturation, aging and decay in fruit and vegetables. GS

1621

Harper (SJ) and McDaniel (MR). **Carbonated water lexicon : Temperature and CO_2 level influence on descriptive ratings.** *Journal of Food Science* 58(4): 1993: 893-898

A lexicon for describing the sensory perception of carbonated water was developed by a trained panel. It included: salty, sour, bitter, cooling, astringency, bubbly, bubble size, bubble sound, gas expansion feeling, bite, burn and numbing. Four CO_2 levels (noncarbonated, and 1.69, 2.75 and 4.63 vol.) and 2 temp. (3 and 10°C) were tested. Ratings of all descriptors, except cooling, increased significantly as CO_2 level increased. Bubble size and bubble sound were rated higher for 10°C samples while cooling, bite, burn and numbing were rated higher for 3°C samples. The descriptors were classified into 4 groups (cooling, taste, trigeminal, and mechanoreception descriptors) based on principal component analysis. AA

1622

McHugh (TH), Avena-Bustillos (R) and Krochta (JM). **Hydrophilic edible films: Modified procedure for water vapor permeability and explanation of thickness effects.** *Journal of Food Science* 58(4): 1993: 899-903

The ASTM E96 Standard Method for determining water vapor permeability (WVP) was modified for hydrophilic edible films. Accurate measurement of rh conditions and maintenance of 152 m/min air speeds were essential outside the test cups. The WVP Correction Method was developed to account for the water vapor partial pressure gradient in stagnant air layer of the test cup. Errors were as high as 35% without this correction. Applying these guidelines explained commonly observed thickness

effects on WVP values of hydrophilic films. Rh was the cause of observed thickness effects. AA

1623

Avena-Bustillos (RJ) and Krochta (JM). **Water vapor permeability of caseinate-based edible films as affected by pH, calcium crosslinking and lipid content.** *Journal of Food Science* 58(4): 1993: 904-907

Edible films were cast from solutions of Na or Ca caseinate and from emulsions of these proteins with acetylated monoglyceride, beeswax, and stearic acid. The water vapor permeabilities of the films were evaluated at 25°C using the ASTM E96-80 method, modified to calculate the % rh at the film underside. Adjustment to pH 4.6 (isoelectric point), Ca ion crosslinking and combined effects of Ca ascorbate buffer (pH 4.6) reduced water vapor permeability of Na caseinate films by 36%, 42% and 43% respectively. Ca caseinate-beeswax emulsion films had water vapour permeabilities up to 90% lower than pure Na caseinate films. Water vapour permeability varied by a factor of two depending on emulsion film orientation, indicating nonisotropic structure. AA

1624

Roos (Y) and Karel (M). **Amorphous state and delayed ice formation in sucrose solutions.** *International Journal of Food Science and Technology* 26(6): 1991: 553-566

Phase transitions of amorphous sucrose and sucrose sol. (20 - 100% sucrose) were studied using differential scanning calorimetry, and related to viscosity and delayed ice formation. Glass transition temp. (T_g) was decreased by increasing water content. Ice formation and concurrent freeze concn. of the unfrozen sol. increased apparent T_g. T_g could be predicted wt. fractions and T_g values of components. Williams-Landell-Ferry (WLF) relation could be used to characterize temp. dependence of viscosity above T_g. Crystallization of water above T_g was time dependent, and annealing of sol. with < 80% sucrose at -35°C led to maximally freeze-concentrated state with onset of glass transition at -46°C, and onset of ice melting at -34°C. The state diagram established with experimental and predicted T_g values is useful for characterization of thermal phenomena and physical state at various water contents. AA

Chemistry (Analytical)

1625

Verma (BC), Sharma (DK), Thakur (HK), Gopal Rao (B) and Sharma (NK). **Colorimetric method for the determination of captafol (difolatan) in commercial formulations and residues on grains and apples.** *Analyst (London)* 116(8): 1991: 867-870

A simple and rapid colorimetric methods for the microdetermination of captafol (difolatan), based on its reaction with a dithiocarbamate, has been developed. The bright yellow colour which develops instantaneously on mixing the fungicide with the reagent is stable for at least 12 h. The method has been successfully adapted to the detn. of captafol in its formulated products and residues on grains and apples. AA

FOOD MICROBIOLOGY AND HYGIENE

1626

Kanawjia (SK), Sanju Garg and Singh (S). **Microbiological and enzymatic production of flavour and fragrant chemicals.** *Indian Dairyman* 44(9): 1992: 433-443

Details on inherent advantages of using microorganisms in flavour production: the wide var. of flavour compounds which microorganisms are capable of producing: biosynthetic pathways in microbial flavour formation: major flavour compounds in fermented dairy products: and production of flavouring compounds like pyrazines, menthol, lectones, esters, terpenes, malt flavour, diacetyl, through microbial processes are presented. GS

Fermented foods

Dhokla

1627

Kanekar (P) and Joshi (N). ***Lactobacilli fermentum*, *Leuconostoc mesenteroides* and *Hansenula silvicola* contributing to acetoin and folic acid during 'dhokla' fermentation.** *Indian Journal of Microbiology* 33(2): 1993: 111-117

Dhokla, a popular fermented food prepared by fermenting a mixture of Bengal gram flour and curd for 16-18 h at 28 plus or minus 2°C and steaming the batter for 20 min was analysed for biochemical changes brought about by pure cultures of *Lactobacillus fermentum*, *Leuconostoc mesenteroides* and *Hansenula silvicola*. The extent of fermentation was significant in the batters fermented with the yeast indicating its positive contribution to the fluffy texture of the product. Flavour compounds like lactic acid and acetoin were due to lactic acid bacteria. *Lactobacillus fermentum* and *Leuconostoc mensenteroides* contribute to pleasant fermented flavour and sour taste. GS

Microorganisms

Fungi

Mushrooms

1628

Yang (DC) and Le Maguer (M). **Mass transfer kinetics of osmotic dehydration of mushrooms.** *Journal of Food Processing Preservation* 16(3): 1992: 215-231

Sliced mushrooms were blanched and osmotically processed in 5, 10 and 15% salt sol. for 5, 10, 20 and 30 min at room temp. (type I). Sliced and blanched mushrooms were osmotically dehydrated in 60% sucrose sol. for 10 min at 50°C and then transferred to the same processing conditions as in type I (type II). A mathematical model used to describe the mass transfer kinetics for the two types of mushrooms adequately explained the solutes exchangers during osmotic dehydration. The 15% NaCl sol. was optimum for both types of processing. Pretreatment of mushroom in high concn. of sucrose sol. followed by treatment in high salt concn. sol. was most effective to remove water and salt loading to further lower the a_w in mushrooms. The process method for type II mushroom was the best for controlling NaCl penetrations. SD

Hygiene

1629

Harrington (RE). **The role of employees in the spread of foodborne disease - Food industry views of the problem and coping strategies.** *Dairy, Food and Environmental Sanitation* 12(2): 1992: 62-63

BIOTECHNOLOGY

Nil

TISSUE CULTURE

NIL

FOOD ADDITIVES

Nil

CEREALS

1630

Ramzan (M), Joia (BS), Judge (BK) and Chawla (RP). **Evaluation of a commercial neem extract formulation as grain protectant of stored wheat and rice.** *Bulletin of Grain Technology* 30(1): 1992: 82-84

Commercial aqueous neem extract formulation at the dosages ranging from 100 to 5000 p.p.m. could not overcome the natural infestation of *T. castaneum, R. dominica, C. ferugineus* in wheat and *C. cephalonica* in rice stored in bags for 3 months. Need for improvements in the product formulation to exploit the potential of grain protectants are discussed. GS

Rice

1631

Santhi (M), Mayuravalli (VVL), Krishnamurthy (MM) and Reddy (GPV). **Studies on the effect of certain insecticides against the lesser grain borer, *Rhizopertha dominica* Fab. on rice in storage.** *Andhra Agricultural Journal* 38(1): 1991: 129-131

Four synthetic pyrethroids decamethrin, cypermethrin, fenvalerate and permethrin were sprayed on rice stored in gunny bags and compared with malathion for their residual toxicity. All of them were found to be superior in recording higher mortalities. GS

1632

Piggott (JR), Morrison (WR) and Clyne (J). **Changes in lipids and in sensory attributes on storage of rice milled to different degrees.** *International Journal of Food Science and Technology* 26(6): 1991: 615-628

Under-milled and well-milled rice samples were compared, before and after storage, by chemical and sensory tests. Surface lipids, non-starch lipids, and starch lipids were quantified, and free fatty acids, total carbonyls and hexanal contents of the surface lipids were determined as measures of lipid hydrolysis and oxidation during storage for up to 9 months at -20 and 30°C. Descriptive sensory analysis of cooked rice by a trained panel was used to compare odour, taste and mouth-feel of both stored and freshly milled samples. Triangle and preference tests by an untrained panel were used to establish whether perceptible differences were caused by the degree of milling or the storage conditions. Similar changes, both chemical and sensory, occurred in the under-milled and well-milled rice during storage but these were more

pronounced in the under-milled rice, leading to a product of poorer storage stability and reduced preference. AA

Wheat

1633

Gurusharan Singh, Harnail Singh, Thapar (VK), Sehgal (VK) and Shashi Paul. **Post-production losses of wheat at farm level in Punjab.** *Bulletin of Grain Technology* 30(1): 1992: 20-27

Various types of post-harvest losses of wheat in Punjab state, India were assessed for the development and introduction of measures designed to reduce them. Loss due to harvesting was with sickle 1.49 to 1.55%; harvest - combine 1.57 to 1.60%; and motorised thresher 1.42 to 1.45%. Improved storage structures like metal bins and pucci kothis reduced the losses (1.65 - 1.73%). In traditional storage structures made of mud such as kutchi kothi bharola bharoli and gunny bags the loss was very high ranging from 6.79 to 6.84%. Rice-weevil *Sitophilus oryzae* (Linn.), lesser grain borer (*Rhizopertha dominica* (Fab.), khapra beetle *Trogoderma granarium* (Everts) and rust red flour beetle *Tribolium castaneum* (Herbst) were the predominant insects attacking stored wheat grains. Loss during marketing and transportation of wheat grains was 0.80% and 0.12% respectively. GS

Wheat starch

1634

Cai (W) and Diosady (LL). **Model for gelatinization of wheat starch in a twin-screw extruder.** *Journal of Food Science* 58(4): 1993: 872-875, 887

Wheat starch was processed in a co-rotating twin-screw extruder, at moisture contents 25% and 30%, screw speeds 200 and 300 r.p.m., feed rate 30 kg/h, and barrel temp. settings 100, 120, 140 and 160°C. Degree of starch gelatinization at each point along the extruder channel was determined by sampling and analyzing material inside the extruder. Kinetics of the gelatinization during extrusion was investigated. A first-order rate equation was developed to predict degree of starch gelatinization during extrusion. The rate constant was a function of both temp. and shear stress. AA

MILLETS

Corn

1635

Suryanarayana Raju (G), Arciniega (CG), Visweswaraiah (K) and Majumdar (SK). **Effect of lime processing of corn on the fate of fenitrothion and methyl parathion residues.** *Bulletin of Grain Technology* 30(1): 1992: 38-43

Effect of pesticide residues on corn (maize) and its processed products is discussed. Corn is protected from insect infestation by treating with fenitrothion at 50-100 p.p.m. level and also with methyl parathion at 20 p.p.m. level. Lime processing - whole grain cooked for 1 h at 98°C with 1% sol. (1:2) reduced fenithrothion in the corn from 33.6 to 1.8 p.p.m. and methyl parathion from 12.3 to 0.95 p.p.m. Lime processing reduced high quantities of toxic residue to safety limits. Lime being indigenously available, inexpensive and harmless, is a good pesticide decontaminating agent. GS

1636

Joshi (BC), Prajapati (SK), Arora (KK), Lal (J) and Sone Lal. **Survey of aflatoxin contamination in freshly harvested maize crop in five villages in Bulandshahar district.** *Bulletin of Grain Technology* 30(1): 1992: 44-47

Aflatoxin contamination in freshly harvested maize crop in 5 villages of Bulandshahar, Uttar Pradesh, India, was assessed. 38.3% of the samples were contaminated with aflatoxin B1, while more than 50% of the contaminated samples had aflatoxin above 30 p.p.b. level. GS

Sorghums

1637

Shelar (VR) and Bapat (DR). **Viability, vigour, electrical conductivity and leaching of sugars from sorghum (*Sorghum bicolor*) (L.) Moench.) genotypes during storage under controlled conditions.** *Bulletin of Grain Technology* 30(1): 1992: 48-57

Four var. of sorghum, CSH-5, CSH-9, SPV-462 and SPV-504, were compared with their viability, vigour, electrical conductivity and leaching of sugars, during storage under controlled conditions (20 to 40°C and RH 45, 60 and 90). Germination % of sorghum seed decreased significantly during storage and it was more at 40°C than 20°C. All genotypes stored well under cooler (20°C) and drier (45% RH) conditions. Warmer (40°C) and humid (90% RH) storage conditions adversely affected the seed viability. Under the same storage conditions hydrids stored better than the other var. Vigour of all genotypes decreased while leaching of sugars and electrical conductivity increased during storage. GS

PULSES

1638

Li (BW) and Cardozo (MS). **Simplified enzymatic-gravimetric method for total dietary fiber in legumes compared with a modified AOAC method.** *Journal of Food Science* 58(4): 1993: 929-932

Two methods (and AOAC and a simplified enzymatic-gravimetric method) were used to analyze 7 types of canned legumes and 8 cooked legumes. Total dietary fiber (TDF) of the canned products ranged between 17% and 23% (dry basis) for chick peas, Great Northern beans, kidney beans, pinto beans, pork and beans, vegetarian beans in tomato sauce, and 27 - 31% for wax beans. These values were comparable for both methods. However, results on cooked legumes were very different between methods. TDF values for several types of beans and peas were higher and ranged between 31% and 55% by the AOAC/Tris-Mex buffer method as compared to 17% and 29% using the simplified method. Chemical analysis of dietary fiber residues showed the major difference between the methods was in the extent of starch removal as affected by starch gelatinization. AA

1639

Doharey (RB), Goyal (RK), Tiwari (GP) and Sone Lal. **Assessment of storage losses in whole pulses at farm level in few districts of Uttar Pradesh.** *Bulletin of Grain Technology* 30(1): 1992: 3-6

Losses caused by pulse beetles *Callosobruchus chinensis* (L.) and *C. maculatus* (F.) in whole pulses, viz., green gram (*Vigna radiata* Wilczek), red gram (*Cajanus cajan* L.), Bengal gram (*Cicer arietinum* L.) and Black gram (*Vigna mungo* L.) stored at farm level in different storage structures were assessed in Mathura, Kanpur Dehat and Hamirpur districts of Uttar Pradesh, India. A max. of 13.8% loss in wt. was recorded in green gram stored in gunny bags, 12.02% in red gram stored in Kalsha (brass pot) and min (1.13%) in tin container after 6 months of storage. In case of Bengal gram, 3.15% loss in wt. was recorded in the grain stored in gunny bags after 5 months while in black gram 0.90 to 3.15% loss was recorded in tin containers after 7 months of storage. Some of the farmers in Kanpur Dehat were found mixing wood ash and kerosine oil with the grains and some periodically cleaning and sun-drying the grain. Tin containers proved to be the mostsuitable structures for storage of whole pulses at farm level as compared to other structures, viz., gunny bag, matka (earthern pot), kalsha, etc. AA

1640

Shehata (AME). **Hard-to-cook phenomenon in legumes.** *Food Reviews International* 8(2): 1992: 191-221

The following topics are discussed with regard to different types of hard-to-cook-legume (HTCL): the environmental factors affecting their development: the structural and the chemical changes associated with their presence: the treatments which are used or suggested to control their development or to improve the texture of HTCL: and the possible relations between these subjects. Several propositions concerning the mechanisms involved in hard-texture seeds are discussed. Variations in the physical properties and chemical composition of the seeds of different legumes and of different varieties are summarized in several tables. 162 references. BV

Bengal gram

1641

Agrawal (AK), Kanjilal (SC) and Bansode (PC). **Evaluation of bins of bamboo strips and nirgudi twigs for storage of Bengal gram.** *Bulletin of Grain Technology* 30(1): 1992: 58-62

Structures Akola bin (A-1 and A-2) and Rahuri bin (A-3 and A-4) stored Bengal gram statisfactorily for a period of 5 to 6 months. Mud plastering and moisture proofing by tracoal layer of bins effectively controlled grain moisture content. Grain stored in all types of bins remained insect infestation-free during 130 days of storage. Average germination per cent of stored grain was more than 90%. Akola bins with double wall and hopper bottom are available all over Maharashtra and costs Rs. 300/-. Rahuri bins with single layered flat bottom are available only in a few regions and costs Rs. 60/-. GS

Chickpeas

1642

Hung (TV), Liu (LH), Black (RG) and Trewhella (MA). **Water absorption in chickpea (*C. arietinum*) and field pea (*P. sativum*) cultivars using the Peleg model.** *Journal of Food Science* 58(4): 1993: 848-852

Moisture absorption in 7 chickpea (*Cicer arietinum*) cvs and 3 field pea (*Pisum sativum*) cvs was investigated at 5, 15, 25 and/or 42°C using the Peleg model ($M(t) = Mo + t/[K_1 + K_2t]$). The Peleg constant K_1 varied with temp. At a given temp., the lower the K_1, the more water was absorbed. The Peleg constant $K_2$was almost unaffected by temp. and could be used to predict the equilibrium water absorption. A constant K_3 expressing the temp.

effect on water absorption ($K_1 = K_3T + K_4$) was developed to distinguish two types of chickpea - Desi and Kabuli. All chickpeas had similar composition and initial moisture. The difference in water absorption rate was probably due to thickness and structure of the seed coat. The Peleg model could be used to predict water absorption in chickpea and field pea. AA

1643

Singh (U) and Seetha (R). **Oil absorption and sensory properties of a snack food from chickpea genotypes.** *Journal of Food Science* 58(4): 1993: 853-855

Among the commonly consumed grain legumes the score on general acceptability of a snack food (*seviya*) was the highest for that from chickpea (*Cicer arientinum* L.) followed by lentil, pigeonpea and greengram, whereas the oil absorption by the product was highest for lentil followed by blackgram, chickpea, and greengram. Different methods of dehulling did not cause any notable effects on oil absorption of chickpea *Seviya*. The flour particle size, starch, and protein contents significantly influenced oil absorption of *seviya*. The oil absorption of the product differed significantly among genotypes, but clear cut differences were not found between desi and kabuli groups of chickpea genotypes. AA

1644

Singal (SK). **Treatment of stored chickpea, *Cicer arietinum* L. with plant edible oils for protection against pulse beetle *Callosobruchus chinensis* (L.).** *Bulletin of Grain Technology* 30(1): 1992: 85-87

Plant oils viz. groundnut, coconut, mustard, soybean and rapeseed oils at 3 levels - 1, 3 and 5 ml/kg were used as surface protectants on stored chickpea var. H-81-73 against *C. chinensis*. No seed damage and loss in wt. was observed in seeds treated with oils at 5 ml/kg during 6 months of storage. At the same dose during 9 months of storage only soybean and rapeseed oil treatments caused seed damage (9.7 and 9.8%) and loss in seed wt. (5.0 and 5.2%) respectively. GS

Cowpeas

1645

Rincon (F), Ros (G) and Collins (JL). **Mineral loss in cowpeas (*Vigna unguiculata* (L.) Walp] by pressure heating in water.** *Journal of Food Science* 58(4): 1993: 856-858

The retention of selected minerals of four maturity levels of cowpea when pressure heated in a min. amount of water was determined. As the cowpeas increased in maturity Zn, Cu, Mn, Mg and K increased. Fe decreased and Ca did not change. All minerals analyzed decreased with heating Cu, Ca and Mg ($P < 0.001$), Zn, Fe and K ($P < 0.01$) and Mn ($P < 0.05$). GS

Pigeon peas

1646

Kurien (PP), Ramakrishnaiah (N) and Pratape (VM). **A method for separation of pearled pigeon pea grains from whole grains based on differences in their bouncing properties.** *Research and Industry, India* 38(2): 1993: 77-82

A technique and a simple equipment based on differences in their bouncing properties when dropped on an inclined hard surface (anvil) for the separation of pearled pigeon pea from a mixture of whole and pearled grains is developed. Elliptical trajectories of the bouncing pearled and whole grains were traced and optimum conditions of drop distances, inclination of anvil, height and distances of intercepting boards and moisture levels of grains for max. separation are standardised. A separation efficiency of 61.2% of pearled grains in 4 successive bouncing passes under standardised conditions is obtained. The technique, after suitable scale-up studies, has the potential for use in dhal milling industry. AA

OILSEEDS AND NUTS

1647

Chowdhury (AR), Gupta (RC) and Banerji (R). **Chemical-composition of some minor oilseeds.** *Journal of the Oil Technologists Association of India* 25(1): 1993: 19-21

Seeds from 6 plants *Anisomeles malabarica* R. Br (Labiateae) *Cleome viscosa* Linn. (Capparidaceae), *Lobelia excelsa* Lesch. (Lobeliaceae), *Oncoba spinosa* Forsk (Flacourtiaceae), *Swietenia marcophylla* King (Meliaceae) and *Zanthoxylum budrunga* Wall. (Rutaceae) were analysed for fat, protein and ash contents, fatty acids and mineral compositions. All the seed oils were rich in 18:1 and 18:2 acids and their fatty acid compositions, saturated - unsaturated fatty acids ratio were comparable with those of peanut, soybean and chickpea. GS

Almonds

1648

Teotia (MS), Berry (SK) and Sehgal (RC). **Studies on the post-harvest shelf-life of green almonds.** *Indian Food Packer* 47(2): 1993: 53-57

Storage life of green almond fruits packaged in ventilated polyethylene pouches were assessed at room temp. 30-35°C; (30-60% RH), 8-10°C (80-85% RH) and 0-2°C (70-75% RH). Physiological loss in wt., changes in colour and texture of the fruits and sensory quality characterisitcs of the kernels were recorded at different intervals. Samples were found to store satisfactorily for 10 days, 60 days and 105 days respectively at 30-35°C, 8-10°C and 0-2°C. AA

1649

Sathe (SK). **Solubilization, electrophoretic characterization and *in vitro* digestibility of almond (*Prunus amygdalus*) proteins.** *Journal of Food Biochemistry* 16(4): 1993: 249-264

Almond protein solubility characteristics, polypeptide composition and the *in vitro* susceptibility of almond proteins to common digestive proteins were studied. 95% of the almond protein were water soluble with a min. solubility at pH less than or equal to 4.0. NaCl (0.1M) decreased the almond protein solubility in aqueous medium. Pepsin was most efficient in hydrolyzing the almond proteins. GS

Coconuts

1650

Cherian (S) and Nair (KC). **Biochemical studies of coconut meat from palms affected by varying intensity of root (Wilt) disease.** *Madras Agricultural Journal* 79(8): 1992: 464-467

Copra recovery varied from 12.38 to 13.77% in whole nut and 134.1 to 159.5 g/nut was not significantly different. Moisture content of the fresh coconut meat varied from 34.02 to 37.22, total sugars from 3.56 to 4.64% and protein from 2.06 to 2.63%. Oil content varied from 61.02 to 64.00% in the moisture free samples. Fibre ranged from 6.75 to 9.11%; ash content from 1.54 to 1.75%, potassium (being the highest concn.) from 558.73 to 703.64 mg/g %, Na from 14.29 to 17.81 mg/g %, Mg from 102.1 to 133.97 mg/g of the sample and P from 229.15 to 271.21 mg/g GS

1651

Sandhu (JS), Narayana Swamy (M), Prema Viswanath, Nusrath Nasir and Nagaraja (KV). **Quality status of desiccated coconut.** *Indian Coconut Journal* 23(2): 1992: 5-10

Desiccated coconut samples were analysed to assess their microbial and chemical quality. Samples were found heavily contaminated showing average bacterial load of 0.76×10^6, 540 coliform, 17 *E. coli*, 3×10^3 Staphylococci and 6×10^2 yeasts and moulds per gram. *Salmonella* were present in 30% of the samples. Only 20% of the samples conformed to BIS Standards. However, all samples could be hazardous due to the presence of *Staphylococcus aureus*. Presence of such heavy load of microorganisms in a low moisture food indicated lack of proper sanitation during processing. Microbial load decreased during storage, but chemical quality deteriorated with passage of time. AA

Groundnuts

1652

Varman (PV) and Paramasivam (K). **Genetic architecture of yield and quality characters in groundnut.** *Madras Agricultural Journal* 79(12): 1992: 688-693

The study of genetic architecture of the quality attributes of groundnut viz., shelling %, hundred-kernel wt., sound mature kernel %, showed they were all controlled by both additive and non-additive gene action. GS

Soybeans

1653

Montelongo (J-L), Chassy (BM) and McCord (JD). ***Lactobacillus salivarius* for conversion of soy molasses into lactic acid.** *Journal of Food Science* 58(4): 1993: 863-866

Lactic acid production in soy molasses was optimal at pH 5.6 and 42°C. Addition of 0.5% yeast extract to soy molasses reduced fermentation time from 36 to 10 h and increased lactic acid production by 30%. GS

1654

Furuta (S), Hayakawa (I) and Fujio (Y). **Hydrostatic pressures in wet grinding of soybean with a double-disk attrition mill.** *International Journal of Food Science and Technology* 26(6): 1991: 575-582

Soybean was finely ground with a modified double-disk attrition mill by a wet-grinding process. The hydrostatic pressure in the gap between the rotating and stationary disks of the mill decreased with radial distance between the central inlet and

the peripheral exit in the disks. Observed values were in good agreement with theoretical values derived from Bernoulli's equation. The max. hydrostatic pressure was found at the feed entrance zone of the gap under any given operational conditions. The effects of rotational speed, gap width and soybean feed concn. on the hydrostatic pressure were measured. This implied that increase in hydrostatic pressure from height of feed head and/or increased speed will increase output. AA

Soy products

Soy milk

1655

Kwok (KC), Qin (WH) and Tsang (JC). **Heat inactivation of trypsin inhibitors in soymilk at ultra-high temperatures.** *Journal of Food Science* 58(4): 1993: 859-862

Soymilk samples at pH7.5, 6.5 and 2 were subjected to heat treatment at 93°C and indirect ultra-high temp. When heated at 93°C, 121°C and 132°C, trypsin inhibitor activity (TIA) in soymilk was more heat-labile at high pH than at lower pH. However, the effect of pH on rate of thermal inactivation was less pronounced when the holding temp. was increased to 143 and 154°C. The point on a curve relating holding temp. and holding time, indicating inactivation of 90% of the TIA in soymilk at pH 6.5 in the range 93-154°C, coincided with the thermal-death-time curve of the organism putrefactive anaerobe 3679 at about 125°C. AA

1656

Schaefer (MJ) and Holdt (CS). **Comparison of pudding, soup and custard prepared from soy-milk and low-fat milk.** *Journal of Food Quality* 15(6): 1992: 409-421

Soy milk (4 and 6% solids) was substituted for low-fat milk in chocolate pudding, tomato soup and baked egg custard. Pudding became less viscous, darker and less sweet, tomato soup more viscous, light and less intense flavour and baked egg custard less smooth, darker and less sweet. All the products showed less characteristic flavour than control. SD

Soy paneer

1657

Gangopadhyay (SK) and Chakrabarti (SR). **Technology for preparation of soy - *paneer*.** *Indian Journal of Dairy Science* 45(11): 1992: 598-600

Soy-paneer prepared by lactic acid, citric acid and calcium lactate as coagulants at 80, 85 and 90°C showed that citric acid produced max. yield (32.46 to 33.48%) and calcium lactate resulted lowest yield with highest total solids. Soy-paneer obtained at 85°C yielded better body and texture. Lactic acid and citric acid produced fragile texture. SRA

Soy proteins

1658

Hayashi (N), Hayakawa (I) and Fujio (Y). **Entrance effect correction on the flow of moisturized soy protein isolate melt in an extrusion viscometer.** *International Journal of Food Science and Technology* 26(6): 1991: 567-574

A newly developed capillary viscometer, having an airtight sample cell and capillary system, was utilized to determine the flow properties of moisturized [70% dry basis (d.b.)] soy protein isolate (SPI) melt at 140°C. Pressure drop measurement with an orifice die was done to clarify the large end effect. An end effect correction method was performed by substracting the orifice die data from the capillary tube data, and reasonable results were obtained. The flow properties of the SPI melt were thus elucidated and could be classified as those of a power law fluid with flow behaviour index of 0.35. It was concluded that SPI with 70% d.b. moisture is an extremely high pseudoplastic fluid at 140°C. AA

Tempe

1659

Mulyowidarso (RK), Fleet (GH) and Buckli (KA). **Changes in the concentration of carbohydrates during the soaking of soybeans for tempe production.** *International Journal of Food Science and Technology* 26(6): 1991: 595-606

Soybeans were soaked for 24 h in tap water at 30°C in preparation for tempe fermentation. Soaking was conducted under conditions that give a microbial fermentation, and in the presence of antibiotics where microbial growth was inhibited. Sucrose, stachyose and raffinose were the main di- and oligosaccharides in the beans, and their concn. decreased by 84, 65 and 50%, respectively, during soaking. Glucose, fructose and galactose were found in the soak-water along with lesser amounts of sucrose, melibiose, raffinose and stachyose. Glucose was the main substrate for microbial growth in the soak-water. The concn. of mono-, di- and oligosaccharides in the beans and in the soak-water were determined by the activity of invertases and α-galactosidases endogenous to the beans, diffusion of the sugars into and out of the

bean, and the species of microorganism growing in the soak-water. AA

1660

Mulyowidarso (RK), Fleet (GH) and Buckle (KA). **Changes in the concentration of organic acids during the soaking of soybeans for tempe production.** *International Journal of Food Science and Technology* 26(6); 1991; 607-614

Soybeans were soaked for 24 h in tap water at 30°C in preparation for tempe fermentation. Soaking was conducted under conditions that give a microbial fermentation, and in the presence of antibiotics where microbial growth was inhibited. Valeric, propionic, formic and acetic were the main acids in the beans. Their concn. decreased progressively during soaking as they were leached from the bean into the soak-water. At the end of soaking, lactic and malic were the main acids in the beans. They were produced by microbial fermentation in the soak-water and diffused into the beans. The concn. of acids produced in the soak-water was determined by the microbial species responsible for the fermentation. AA

TUBERS AND VEGETABLES

Bulb vegetables

Onions

1661

Palanivel (A) and Ramanathan (G). **Effect of application of micronutrients on yield and quality of onion (*Allium cepa* L.).** *Madras Agricultural Journal* 79(8); 1992; 423-426

Soil application of $MnSO_4$ and $FeSO_4$ showed beneficial effect on yield and quality of onion. Quality characteristics expressed in terms of total sugar and pyruvic acid content of the bulb is also taken as a measure of pungency. $MnSO_4$ at 25 kg/ha treatment was recommended for the yield and quality improvement. Black soil was more suited for onion crop and var. MDU-1 performed better than var. CO-3. GS

Carrots

1662

Babic (I), Amiot (MJ), Nguyen-The (C) and Aubert (S). **Accumulation of chlorogenic acid in shredded carrots during storage in an oriented polypropylene film.** *Journal of Food Science* 58(4); 1993; 840-841

Wide variations in initial chlorogenic acid content were observed among the carrot samples. Chlorogenic acid content increased markedly in Karotan 2 var. and senior cv. carrots after the first 24 h storage and declined substantially between 1 and 3 days in Premia var. Storage stability of carrot cv. could not be characterized by its initial chlorogenic acid content and shredded carrots with better storage stability were those which accumulated chlorogenic acid faster during the first 24 h in orientied polypropylene film. GS

1663

Kaloo (G), Amir Singh, Balyan (DS), Baswana (KS) and Pratap (PS). **'Hisar gairic': Carrot bred for nutrition.** *Indian Horticulture* 37(4); 1993; 21

Carrot var. Hisar Gairic (HC 1) developed through mass selection from the germ plasm collected from various parts of the country was compared against the local var. Pusa Kesar. HC 1 showed 18.51% increased yield and 9.29% increased root length than Pusa Kesar. Total carotenoid content on fresh-wt. basis was 96.2 mg/100 g compared with 47 mg/100 g in Pusa Kesar. Light or sandy-loam soil, about 5-6 kg seed having good germination %, raised beds having 40-45 cm space between rows, pre-sowing irrigation and 10-15 cm distance between plant-to-plant are recommended for HC 1 cultivation. SRA

Cassava

1664

Bora (PS), Mariath (MMR), Fioreze (R) and Narian (N). **Changes in the moisture and cyanide contents of bitter cassava during artificial and solar drying.** *Journal of Food Processing Preservation* 16(3); 1992; 163-174

Bitter cassava (*Manihot esculenta* Crantz) dice (2x1x1 cm) were sun-dried and dehydrated at 30, 45, 60°C, air velocity 300 plus or minus 10 cm/min. Dehydration reduced the cyanide content at all temp. Rates of cyanide and moisture removal were fastest at 60°C and decreased with dehydration temp. SD

Tapioca

1665

Balachandran (N) and Gunathilagaraj (K). ***Araecerus fasciculatus* De Geer (Coleoptera: Anthribidae) as a new pest of stored tapioca in South India.** *Science and Culture* 58(1-2); 1992; 32

Tubers

Potatoes

1666

Garrote (RL), Coutaz (VR), Luna (JA), Silva (ER) and Berton (RA). **Optimizing processing conditions for chemical peeling of potatoes using response surface methodology.** *Journal of Food Science* 58(4): 1993: 821-826

The best potato peeling quality, max. yield and min total usage of NaOH was obtained for the following ranges: concn., 11-13%, time 5-5.70 min, and temp. 90-95°C. The max. temp. for which the heating and NaOH penetration depths were equal was 72°C where, at 20% NaOH was 7 min, peeling quality was very good and 'heat ring' was absent. GS

1667

Gekas (V), Oste (R) and Lamberg (I). **Diffusion in heated potato tissues.** *Journal of Food Science* 58(4): 1993: 827-831

The apparent diffusivity of low mol. wt. substances in preheated potato tissues at 25°C was measured and the effect of temp.-induced changes in the tissue matrix on apparent diffusivity of low mol. wt. solutes were described. All solutes showed a sharp decrease of hindrance factor in the region 50-60°C. Heating of potato affected diffusivities of the solutes to different degrees. GS

1668

Kenani (MA), Sinha (NK), Ofoli (RY) and Cash (JN). **Development and sensory characteristics of extruded ready-to-eat prepared potatoes.** *Journal of Food Processing Preservation* 16(3): 1992: 175-183

Atlantic var. of potatoes were extruded and formed into precooked, ready-to-eat simulated baked potatoes. Potatoes were abrasion peeled, diced, steam blanched for 3 min blended with 7% non-fat dry milk and extruded. The extruded product was filled into potato shaped molds and stored at -20°C for 24 h. The frozen product was removed from the molds, dipped into a batter of wheat flour, water, glycine and dextrose to form skin and again stored in frozen condition. Deep frying the frozen products in corn oil at 190°C for 3 min stabilized the skin coat. The microwave-baked simulated potatoes showed high degree of acceptability. SD

Sweet potatoes

1669

Walter (WMJr), Fleming (HP) and McFeeters (RF). **Base-mediated firmness retention of sweetpotato products.** *Journal of Food Science* 58(4): 1993: 813-816

Sweetpotato strips vacuum-infiltrated with 0.01 - 0.15 M solutions of Na_3PO_4, Na_2CO_3, NH_4OH, or NaOH prior to heat processing were firmer than untreated, heat-processed strips. Among the bases Na_3PO_4 and Na_2CO_3 were most effective. When base-treated, cooked tissue was adjusted to its normal pH range (5.9-6.2) and reheated, the retention of firmness did not decrease. Using calcium chloride solution in conjunction with base treatment further increased firmness retention. This process was applied on strips but could readily be adapted to other types of sweetpotato products ranging from dice to chunks. AA

1670

Spanos (GA), Chen (H) and Schwartz (SJ). **Supercritical CO_2 extraction of β-D-carotene from sweet potatoes.** *Journal of Food Science* 58(4): 1993: 817-820

Using supercritical CO_2 to extract β-D-carotene there was approx. a 5-fold or a 3-fold increase in amount of carotenoids extracted from freeze-dried tissue relative to the amount extracted from oven-dried or fresh tissue, respectively. The most efficient conditions were at 48°C and 41.4 MPa. Of the total carotenoid content approx. 20% was inaccessible to supercritical CO_2. The HPLC carotenoid profile of sweet potatoes showed that the unextracted tissue contained 90% β-D-carotene primarily as *all-trans* (ca. 99%). Supercritical CO_2 extracts contained up to 94% β-D-carotene. The isomer composition of bD-carotene of supercritical extracts showed approx. 14% 13-*cis* and 11% 9-*cis*. AA

Vegetables

Cabbages

1671

Chin (H-W) and Lindsay (RC). **Volatile sulphur compounds formed in disrupted tissues of different cabbage cultivars.** *Journal of Food Science* 58(4): 1993: 835-839, 841

Thirty-eight cvs of cabbage (*Brassica oleracea* var *Capitata*) were analyzed for production of volatile sulphur compounds after samples were homogenized and held at 30°C from 10 to 100 min. Allyl isothiocyanate was detected in most cvs, and it was formed rapidly compared to

methanethiol-related compounds. Patterns of methanethiol production varied among cvs. Hydrogen sulphide formed rapidly compared to methanethiol-related compounds, but it was completely depleted after 40 min. Dimethyl disulphide and dimethyl trisulphide concn. initially low (< 0.78 p.p.m.), increased linearly through 100 min (to 3.3 p.p.m.). Wide variations in abilities to produce volatile sulphur compounds were observed for the different cvs. AA

1672

Anju Kumari, Kalia (M) and Surekha Kumari. **Studies on chemical and organoleptic evaluation of cabbage and its product 'Sauerkraut'.** *Indian Food Packer* 47(2): 1993: 11-14

Palatability to Indian taste and consumer acceptability of cabbage and its product "Sauerkraut" were determined. Cabbage contained 93.17% moisture content, 0.14% titratable acidity (lactic acid) 6.18 pH, 19:66 mg/100 g ascorbic acid, 2.85% crude protein, 1.43% reducing sugar and 0.80% fibre content. Sauerkraut prepared in 2.25% salt concn. and 3.50% salt concn. was appreciated by the consumers. The product retained its quality upto 60 days of storage in glass jars. AA

Cucumbers

1673

McFeeters (RF), Thompson (RL) and Fleming (HP). **Malic acid analysis in cucumber juice and fermentation brines in the presence of interfering fructose.** *Journal of Food Science* 58(4): 1993: 832-834

A procedure was developed for HPLC analysis of malic acid in the presence of an interfering fructose peak with an Aminex HPX-87H column. Fructose in cucumber juice or fermented cucumber brine was reduced to mannitol and sorbitol with sodium borohydride. The sugar alcohols eluted after malic acid and did not absorb light at 210 nm so that malic acid could be quantitatively determined either by refractive index or UV detectors. Lactic acid, acetic acid, and ethanol could also be determined in sample after reduction of fructose. AA

Tomatoes

1674

Susheela (T), Pampapathy (K) and Hanumantha Rao (GV). **Studies on varietal differences in fruit quality of tomato (*Lycopersicon esculentum* L.).** *Andhra Agricultural Journal* 38(1): 1991: 84-85

Ten var. of tomato fruit were analysed for TSS, acidity, vitamin C, length and diam. Var. Labonita and max. shape index of 1.187, while var. Bapatla local and AC-238 were the smallest. Max. total sugars was in CFC 98 and Labonita while it was min. in AC-238. Topaz var. had the highest acidity (0.726%) followed by Labonita. The min. acid content (0.362%) was in Bapatla local. SL-22 showed high TSS/acid ratio followed by CFC-98. Topaz var. had the highest quantity of ascorbic acid and it was min. in Bapatla local. The values of the remaining var. Pusa Ruby, Pusa Early Drawf, T-27 and Pant-3 fell in between. GS

1675

Joshi (CD) and Khandekar (RG). **Studies on varietal influence on storage behaviour of tomato harvested at ripe and full ripe stages.** *Indian Food Packer* 47(2): 1993: 43-48

Storage behaviour of tomato var. Sonali. PI-126408, Pusa Ruby, Pelicon, Anahu, VNF-bush, NTDR-1 and EC 118277 under three storage conditions viz. ambient temp., cool chambers and cold storage at 5 maturity stages (green turning, half ripe, ripe and full ripe) were studied. Physiological loss in wt. (PLW) increased with duration of storage irrespective of var. PI-126408 had max. PLW while var. NTDR-1 had the min. irrespective of stage of harvest and storage conditions. Cold stored fruits of different harvest maturity exhibited max. shelf-life at all storage conditons and they showed max. retention of moisture, TSS, acidity followed by those stored at cool chamber and at ambient temp. GS

1676

Naik (DM), Mulekar (VC), Chandel (CG) and Kapse (BM). **Effect of prepacking on physico-chemical changes in tomato (*Lycopersicon esculentum* Mill) during storage.** *Indian Food Packer* 47(4): 1993: 9-13

Tomato fruits from var. Marglobe were packed 500 g each in polyethylene bags, size 10.5" x 7.5" and in 100, 200 and 300 guage with 3, 6 and 9 vents (0.25" diam.) respectively, heat sealed and stored at room temp. Changes in moisture, total soluble solids, acidity and sugars were rapid in control and slowed down in the fruits in polyethylene bags. Fruits in 300 guage polyethylene bags with 3 vents recorded min. changes in all characters during storage. GS

1677

Subbaiah (K). **Effect of nitrogen and azospirillum on yield and nutrient uptake in tomato.** *Madras Agricultural Journal* 79(10): 1992: 600-604

Inoculation of *Azospirillum* in the presence of fertilizer nitrogen had significant influence on N and

P contents in tomato fruits: N content in plant sample but not on the K content in fruit and P and K contents in plant sample. Seed treatment with *Azospirillum* alone or the combination of 75% of the recommended dose of N and soil application with *Azospirillum* had recorded the highest N content in fruit (4.4%). The P content in fruit was also found to be the highest due to combined application of 75% of the recommended dose of N and soil application with *Azospirillum*. GS

FRUITS

1678

Pareek (OP) and Sharma (S). **Under utilized fruits.** *Indian Horticulture* 38(1): 1993: 47-56

Under-utilized fruits lessen our dependence on the conventional fruits. They also hold importance in crop improvement as a source of disease, pest and drought resistance, winter hardiness and vigour. Often promising better nutrition, they come handy when there is famine. Cape gooseberry, persimmon, melinjo, jackfruit, tree tomato, peach palm, canistel, lucuma, wild mangoes and wild apricot are rich in vitamin A: barbados cherry, myricaria dubia, anola, rose hips Indian ber, seabuckthorn, cabeludinha, Byrsonima crassifolia, mahua, lasora and jamun are rich in vitamin C: tamaring, karonda, wood apple, bael, dates and anola are rich in Ca and Fe: butternut, eastern black walnut, European filbert, Brazil nut, java almond, chironji, carob and wood apple rich in proteins: avocado, custard-apple, apricots and dates are energy rich fruits. An exhaustive list of 48 plants from 15 agro-ecological regions and the fruit uses are given. SRA

Apples

1679

Monsalve-Gonzalez (A), Barbosa-Canovas (GV), Cavalieri (RP), McEvily (AJ) and Radha Iyengar. **Control of browning during storage of apple slices preserved by combined methods. 4-Hexylresorcinol as anti-browning agent.** *Journal of Food Science* 58(4): 1993: 797-800, 826

Effectiveness of 4-hexylresorcinol to inhibit enzymatic and non-enzymatic browning in apple slices preserved by combined methods was assessed during storage at 4 temp. Sodium sulphite and ascorbic acid-2-phosphate were used for comparison. Browning as measured by reflectance spectroscopy and based on visible light absorption was partially inhibited by 4-hexylresorcinol comparable to that of a fivefold sulphite concn. at 25°C. At temp. above 35°C, the inhibiting effect of 4-hexylresorcinol was minimal. Energy of activation of the browning reaction was 5-20 kcal/mol and was not affected by anti-browning treatment. Only induction time was delayed by the 4-hexylressorcinol and sulphite treatments. AA

1680

Vyas (KK) and Kochhar (APS). **Studies on cider and wine from culled apple fruit available in Himachal Pradesh.** *Indian Food Packer* 47(4): 1993: 15-21

Suitability of low grade, culled apple (*Malus domestica* Borkh) fruit (Red Delicious and Golden Delicious) available in Himachal Pradesh for cider and wine production was studied. Chemical characteristics of the juice like TSS, acidity and tannins were almost similar to juice from normal marketable fruits. During storage the harsh taste and yeasty odour of the wines and ciders diminished and about 5 mm thick layer of suspended particles settled. No sign of secondary fermentation was observed. After 6 months of storage, the average increase in acidity was 0.2 to 0.25%, volatile acidities ranged from 0.023% to 0.087% and tannin contents of ciders and wines varied from 0.134 to 0.169%. Ethyl acetate varied from 17.6 to 28.72 mg %. Residual sulphur dioxide ranged from 12 p.p.m. to 57 p.p.m. A combination of Golden and Red Delicious and Golden Delicious alone were found equally good for preparing cider and wine. GS

1681

Tsami (E), Vagenas (GK) and Marinos-kouris (D). **Moisture sorption isotherms of pectins.** *Journal of Food Processing Preservation* 16(3): 1992: 151-161

The water adsorption isotherms of LM and HM pectins and pectin gels (made from HM pectin with the addition of sugar) were determined at 25°C, using the standard gravimetric method developed by the European Cooperation Project COST 90. The water-binding properties of these materials were studied through examination of the sorption data. The experimental curves were fitted to one three-parameter equation (GAB equation), eight two-parameter equations reported in the literature, and a two-parameter equation developed in this work. The GAB equation gave the best fitting; however, the results showed that it should not be used for the estimation of the monolayer moisture content. AA

1682

Ladhabhoy (AE). **Plastic crates and containers for packaging of apple produce.** *Packaging India* 25(5): 1993: 21, 23, 25, 27, 29, 31, 33, 35

The status of the horticulture industry in India and the advantages of using plastic moulded crates and

plastic corrugated board cartons over corrugated fibre board (CFB) cartons in the packaging of apple products as well as the other optional packaging materials such as polyethylene foam netting, stretch-net polyethylene film, RPVC foam strip fabricated container and prepackaging are dicussed in this article. CSA

Bananas

1683

Waskar (DP) and Roy (SK). **Studies on harvesting, handling, transportation and marketing of banana.** *Indian Food Packer* 47(4): 1993: 29-38

Analysing post-harvest handling of banana (Dwarf cavendish) var. Basrai, in Jalgoan district of Maharashtra, India, the following suggestions are given: separation of hands from bunches to reduce transport cost: improved handling techniques at farm level to reduce post-harvest bruising and other mechanical damages: speedy and efficient transport: waxing of banana in summer to extend shelf-life: chemical treatments to reduce fungal diseases: adoption of proper ripening method avoiding the use of calcium carbide: introduction of low cost storage structure for short duration storage: introduction of quality and size standard for higher return and improved market information system. GS

Ber

1684

Kadam (SS), Kotecha (PM) and Adsule (RN). **Changes in physico-chemical characteristics and enzyme activities during ripening of ber (*Zizyphus mauritiana* Lamk) fruits.** *Indian Food Packer* 47(2): 1993: 5-10

Changes in sp. gr., juice recovery, total soluble solids (TSS), acidity, reducing sugars, ascrobic acid, tannins, pectin and activities of polyphenol oxidase and peroxidase were studied during the ripening and storage of physiologically matured ber (*Z. mauritiana* Lamk) fruits, at ambient conditions. Sp. gr. of ber fruit decreased gradually from 1.10 to 0.99 during ripening: and peroxidase activity increased as the ripening advanced. Sp. gr., acidity, tannin and pectin contents of ber fruit decreased and TSS, ascorbic acid and peroxidase activity increased gradually during storage. Reducing sugar and polyphenol oxidase activity increased progressively upto 6th day of storage and then slightly decreased. Max. juice recovery (42.5%) was obtained from ber fruits harvested at half yellow stage or at 4th day of storage. GS

Litchies

1685

Chua (RS), Ahmed (F) and Roychoudhury (R). **Effect of post harvest application of calcium on storability of litchi fruit at lower temperature.** *Indian Food Packer* 47(2): 1993: 23-27

Fruits of Litchi cv. Bombai can be successfully stored upto 20 days at 3°C in perforated polyethylene bag after post harvest treatment of Ca (0.1 - 0.5%). Ca 0.5 as $CaCl_2$ was found most effective in reducing physiological loss in wt., spoilage due to fungal diseases, formation of dull peel due to lesser deterioration of anthocyanin and in maintenance of fruit quality with greater loss of acidity, which resulted in increased TSS: acid and sugar: acid ratio of fruits in storage. AA

Mangoes

1686

Ranote (PS), Bawa (AS) and Saini (SPS). **Effect of storage on the quality of processed mango pulp.** *Research and Industry, India* 38(2): 1993: 96-98

Dusehri mango pulp samples processed in poly propylene (PP) 300 guage pouches, bottles (200 ml) and cans (A 2 1/2) were stored at ambient temp. (12-38°C) for 6 months. There were negligible changes in total solids, TSS, acidity, pH, ash, protein contents and viscosity. Reducing sugars and browning increased. Tintometric colour did not change much during prolonged storage. The pouch processed pulp retained and maintained the quality better than that stored in glass bottles and cans. SD

1687

Nadanasabapathi (S), Srivastsa (AN) and Nataraju (S). **Storage study on mangobar in flexible packaging materials.** *Indian Food Packer* 47(4): 1993: 5-8

Indigenously available packaging materials, paper/Al foil/low density polyethylene of 40, 20 and 12 micron, metallised polyester/high density-low density polyethylene and nylon/ionomer are evaluated for packing ready-to-eat commercially available mango bar. Al foil based materials are found necessary for long term storage of mango bar such as supplies to armed forces. AA

Oranges

1688

McCalley (DV) and Torres-Grifol (JF). **Analysis of volatiles from oranges in good and bad condition**

by gas chromatography and gas chromatography-mass spectrometry. *Analyst (London)* 117(4): 1992: 721-725

The vapour from whole Navel oranges was examined using headspace techniques followed by capillary GC and GC-MS with the aim of distinguishing good, damaged and diseased fruit by chemical means. Low concn. of limonene were detected in the headspace of undamaged fruits. Mechanical damage caused considerable increases in the concn. of limonene and volatile terpene peel-oil constituents. *Penicillium* infections in oranges produced different headspace volatiles, with high concn. of acetaldehyde, simple alcohol and esters. BV

Papayas

1689
Rajukkannu (K), Doraisamy (P) and Prasad (G). **Nematicide residues in papaya.** *Madras Agricultural Journal* 79(9): 1992: 542-543

Phenamiphos when applied to papaya at 1 and 2 g ai-tree showed non-detectable residues in fruits harvested after 120 days of application. Similarly carbofuran and aldicarb when applied at 1 g ai/tree there were non-detectable residues in fruits. Fruits harvested from trees which received 2 g ai/tree of carbofuran and aldicarb recorded residues below the MRL values. Carbofuran, aldicarb and phenamiphos at doses tested, control the reniform nematode, without any residue hazard in papaya fruits when the interval between the treatment and harvest of fruits exceeds 120 days. GS

Peaches

1690
Bosch (JR), Gonzalez (AR), Mitchell (JK) and Aselage (JM). **Quality changes in peach puree by brown rot (*Monilinia fructicola*) and biocontrol agents.** *Journal of Food Quality* 15(6): 1992: 449-458

Brown rot caused significant pulp loss and quality changes during post-harvest handling. Infected fruit even when diseased tissue was removed, reduced the quality of the processed product. Also the study indicated that *Bacillus subtilis* (strain b-3) was an effective biocontrol agent for brown rot of peaches without negatively affecting the peach puree quality. *Pseudomonas cepacia* showed limited control of *M. fructicola* and adversely affected the puree quality. SD

Raisins

1691
Canellas (J), Rossello (C), Simal (S), Soler (L) and Mulet (A). **Storage conditions affect quality of raisins.** *Journal of Food Science* 58(4): 1993: 805-809

Moisture content, a_w, colour, browning, texture, SO_2 content, soluble sugars, acidity and pH were determined periodically in stored (11 months in air tight glass containers) raisins. There was a substantial decrease in SO_2 content, especially in samples stored at room temp. (20-25°C) which had higher browning indexes. There was no substantial change in a_w, acidity and pH. No sugaring was observed. Refrigerated samples (stored at 4 and 11°C) were of higher quality in comparison with non-refrigerated samples. GS

Raspberries

1692
Vaughn (SF), Spencer (GF) and Shasha (BS). **Volatile compounds from raspberry and strawberry fruit inhibit postharvest decay fungi.** *Journal of Food Science* 58(4): 1993: 793-796

Fifteen volatiles released by red raspberries and strawberries during ripening were analysed for the inhibition of postharvest decay fungi. Five compounds completely inhibited all fungi directly on fruit at 0.4 µL/ml. Of these, benzaldehyde at 0.04 µL/mL completely inhibited isolated cultures of *Alternaria alternata* *Botrytis cinerea*, and *Colletotrichum gloeosporioides*, while 1-hexanol, E-2-hexenal and 2-non-anone inhibited all 3 fungal species at 0.1 µL/mL. When added directly to media, 0.1% (v/v) benzaldehyde or E-2-hexenal inhibited all three species. Starch encapsulated 2-nonanone reduced fungal decay of raspberries and strawberries in enclosed containers after 7 days at 10°C. AA

Strawberries

1693
Mori (T), Sakurai (M), Shigeta (J-I), Yoshida (K) and Kondo (T). **Formation of anthocyanins from cells cultured from different parts of strawberry plants.** *Journal of Food Science* 58(4): 1993: 788-792

Anthocyanin formation and structural identification were investigated in the cultured strawberry, *Fragaria ananassa* cv Shikinari. Friable callus tissues were obtained from apical meristems, leafs, and petioles grown on LS agar medium with 2,4-dichlorophenoxyacetic acid and benzyladenine. Using these calli, effects of auxins and cell inoculum

size on pigment production were studied in suspension culture. Anthocyanin was produced under 8000 lux after preculture for 3 wk under 800 lux in suspension culture. The main extracted pigment was identified as a peonidin-3-glucoside and the second major pigment was a cyanidin-3-glucoside by FABMS and NMR. Anthocyanin production was stimulated by 2,4-dichlorophenoxyacetic acid and its yield was about 3 times that of indole-3-acetic acid. An inoculum rate of 2 g (fresh wt.)/100 mL LS medium resulted in highest pigment production. The callus derived from the leaf was much higher in anthocyanin production than the others tissues of strawberry. AA

1694

Yang (DC) and Le Maguer (M). **Osmotic dehydration of strawberries in a batch recirculation system.** *Journal of Food Quality* 15(6): 1992: 387-397

Osmotic dehydration in sucrose and glucose sol. of 2 strawberry cvs revealed significant effect of temp. on the water and sugars exchange between strawberry and osmotic sol. but the mass transfer between the cvs was not significant. Glucose gain was higher than sucrose for strawberries osmotically dehydrated in glucose and sucrose sol. at the same mole fraction. Sugars except the osmotic one decreased in concn. during the process. More than 40% of moisture and less than 0.1% of sucrose in strawberries were removed by 63% sucrose sol. with 25°C process temp. for 2 h. SD

CONFECTIONERY, STARCH AND SUGAR

Starch

1695

Wang (J) and Hayakawa (K-I). **Thermal conductivities of starch gels at high temperatures influenced by moisture.** *Journal of Food Science* 58(4): 1993: 884-887

Thermal conductivities (k) of gelatinized starch gels and of starch gels with dissolved sucrose were determined at 80 to 120°C and at 39.6 to 75% moisture by a line heat source probe method. A special made sample holder prevented moisture evaporation during detn. Regression equations relating k to temp. and moisture were developed through stepwise regression analysis. Reliability of the developed equations was verified through experiments. The max. error for regressed k values was 0.0085 W/mK. AA

1696

Guraya (HS) and Toledo (RT). **Determining gelatinized starch in a dry starchy product.** *Journal of Food Science* 58(4): 1993: 888-889, 898

Degree of gelatinization (DG) of starch in dry products was measured from the amount which dissolved in 0.2 N KOH. The dissolved starch was complexed with 0.1N iodine and quantitated from absorption at 600 nm. When pregelatinized starch in KOH was the basis for the standard curve only 94% of added gelatinized starch mixed with raw starch was recovered. Recovery was 100% and coeff. of variation was < 2% when absorbance of a blank was used to correct sample absorbance. The blank was prepared from the same mixture with only raw starch. The procedure adequately differentiated DG in several dry sweet potato-tapioca samples. AA

Sugar

1697

Ram Kumar, Jain (VK), Saleem Sajid (A) and Sanyal (P). **Operating parameters around the rising film long tube evaporator bodies in the sugar industry: A practical aspect - Part V.** *Indian Sugar* 43(1): 1993: 19-24

Efficiency of the long tube evaporator body depends on the design of the systems which are discussed. The velocity of juice in those bodies is high and the detention time of juice at high temp. is very low, say a few seconds. Therefore, if the body is worked at high steam pressure and high efficiency the inversion loss of sugar is min. otherwise it would be on the higher side. AA

Palm jaggery

1698

Nadanasabapathy (S) and Mohan Doss (S). **Dextran content in palm jaggery.** *Science and Culture* 59(1-2): 1993: 27-28

Dextran, a soluble polysaccharide consisting of linear α-1,6 glucose units with occasional branches of α-1,4 glucose, reduces the sensory properties such as colour, taste, aroma and texture of palm jaggery. Comparison of dextran content in jaggery from sugarcane and palm juice is made. Results show that the sucrose content in palm jaggery is 78% and the av. dextran content is 480 p.p.m. which is less than its presence in cane sugar (raw 937.25 p.p.m. and refined 612.25 p.p.m.). GS

Sugarcanes

1699

Nasir Ahmed (S) and Rajasekaran (S). **Effect of planting dates on yield and quality of sugarcane variety CO-6304.** *Indian Sugar* 43(1): 1993: 27-29

Soil of the experimental field in Cuddalore, Tamilnadu, India was sandy loam with pH 7.6 to 7.8, and contained 222-228, 18-19 and 298 kg available N, P_2O_5 and K_2O kg/ha respectively. Monthly planting were done during the first wk of every month starting from December to September and the crop was harvested after 12 months in 2 seasons in 1986-88. CO-6304 var. planted in December and January recorded highest yield of 129 t/ha while max. recovery was obtained in the crop planted in March. CCS was the best when it was planted in December - March and May. SRA

1700

Sudama Singh, Verma (PS), Saxena (MMS) and Singh (BD). **CoS 90265 - an early high sugar variety for U.P.** *Indian Sugar* 43(1): 1993: 31-33

Var. CoS 90265 (progeny of cross Co 775 x Co 1148) developed at Coimbatore, Tamilnadu, India, in 1984, was selected for PVT in 1988-89 and studied along with standard CoS 687 at fertility level of 150 kg N/ha under normal irrigation during 1989-90 and 1990-91. Its ratooning ability was also studied along with check var. CoS 687 in 1990-91 under 180 kg N/ha with normal irrigations at Shahjahanpur, Uttar Pradesh, India. CoS 90265 being an early high sugar and non-lodging var. was superior to early maturing var. CoS 687 in germination, millable canes, yield and CCS and to CoS 687 in ratooning capacity. SRA

1701

Uppal (SK). **Distribution of sugars and invertase activity in immature and mature storage tissues of growing sugarcane.** *Indian Sugar* 43(1): 1993: 35-39

Five promising genotypes CoJ 64, CoJ 82, CoJ 83, CoJ 77 and CoS 767 grown in subtropical India were analysed for the contents of sucrose, hexoses and soluble invertase in mature and immature stages, at top and bottom portions of the stalk. Bottom portion of the stalk had higher sucrose contents than top portion except in CoS 767 var. With aging of the cane, sucrose content in each portion of the stalk gradually increased with fall in reducing sugars. Glucose was higher at tillering, stem elongation and ripening stages of growth. However, fructose was higher at maturity. Acid invertase and its ratio to neutral invertase was more in top portion of the stalks. Invertase activity was parallel to the contents of reducing sugars in all the var. at different stages of growth. SRA

BAKERY PRODUCTS

1702

Vaidehi (MP), Lakshmi (RVS) and Begum (MJ). **Effect of dietetic baked products on clinical indicators of some obese, diabetes mellitus and hypertensive subjects.** *Indian Baker* 23(2): 1992: 17-24

Seventeen modified products, of biscuit variation, 3 cake variation and 5 bread variation were prepared, given to obese, diabetic and hypertensive subjects, 35 in each category for 2 months and their initial, final wt., blood pressure and urinary glucose monitored. Defatted soy flour were incorporated in breads and cakes at 5% and in biscuits and cookies at 10-25% levels. Dietetic baking powder with potassium bicarbonate and potassium bitartarate were used in the products. Sunflower oil was used instead of bakery fats, margarine and butter. Potassium salt was used instead of sodium salt for hypertensive subjects. The proximate nutrient composition of all products is given. There was significant wt. reduction between initial and final values but no significant change in blood pressure and glucose. SD

Chapaties

1703

Syed (HM), Rathi (SD) and Sawate (AR). **Hydrolysis of phytate in whole meal and atta chapaties.** *Bulletin of Grain Technology* 30(1): 1992: 32-37

Fermentation and acidification techniques improved the phytate hydrolysis in chapaties. Yeasted whole meal dough hydrolysed phytic phosphorus (51.35 to 59.7) during 8 h of resting in comparison of 54.26 to 65.77% by lactic acid alone (pH 5.1 - 5.2). Combination of bakers yeast (0.5%) and lactic acid (0.2%) improved the rate of phytate hydrolysis. GS

Dough

1704

Kim (HS), Seib (PA) and Chung (OK). **D-Erythroascorbic acid in Bakers' yeast and effects on wheat dough.** *Journal of Food Science* 58(4): 1993: 845-847, 862

Extraction of hydrated and freeze-dried bakers' yeast yielded approx. 50 µg erythroascorbic acid (EAA) and 5 µg ascorbic acid (AA)/g dry yeast as determined by HPLC with electrochemical detection. D-EAA (82 p.p.m. based on flour) slightly increased the flow of dough as rest time increased. Gluten isolated from a flour-water dough containing 82 p.p.m. D-EAA or 100 p.p.m. L-cysteine stretched at a faster rate than control gluten. EAA like AA did not change dough development time. Unlike AA, EAA showed neither oxidizing effect on dough and gluten nor improving effects on bread. AA

MILK AND DAIRY PRODUCTS

1705

Agrawala (SP), Das (S), Sawhney (IK) and Bikram Kumar. **Dairy boiler to run on biogas.** *Indian Dairyman* 44(9): 1992: 429-431

Biogas system design, mechanized handling of cattle dung and slurry, biogas utilization and burner modifications in the boiler installed at the National Dairy Research Institute, Karnal, India, are described. Techno-economic feasibility of this system is evaluated. Integrated approach of raising own herd and milk processing plant could be beneficial. Advantages of elimination of insanitary conditions around milk production centre and improved manurial value of effluent slurry are enumerated. GS

1706

Lotan Singh and Thomas (CK). **Knowledge and adoption in the technology of dairy farming and its constraints.** *Indian Dairyman* 44(9): 1992: 445-450

Level of knowledge, adoption and contraints of dairy farmers are identified in the Indian dairy industry. Level of knowledge and adoption of newer technologies in dairy enterprise are higher in adopted village over non-adopted village, because of the availability of better facilities for dairy farming. GS

1707

Bhatt (PK) and Upadhyay (KG). **In search of 'pointers of quantum-leap' as 'catalysta' for accelerated dairy development - some thoughts to ponder.** *Indian Dairyman* 44(9): 1992: 451-454

Role of the National Dairy Development Board, National Cooperative Dairy Federation of India and National Productivity Council in modernising and increasing the productivity of the Indian dairy industry are discussed. GS

1708

Baldwin (AJ), Lovell-Smith (JER) and Brink (MJV). **Thermal design of cream crystallising silos.** *Australian Journal of Dairy Technology* 47(2): 1992: 83-87

Silos such as cream crystallising and cream storage silos with a water curtain should be either installed without cladding and situated in their own self-contained room, or should be fitted with an outer skin to the silo, if installed outside the factory. The outer skin should not be rigidly attached to the internal wall, to allow independent expansion and contraction of the walls. This prevents stress corrosion and cracking in the silos. GS

Milk

1709

Bhaskar (AR), Rizvi (SSH) and Sherbon (JW). **Anhydrous milk fat fractionation with continuous countercurrent supercritical carbon dioxide.** *Journal of Food Science* 58(4): 1993: 748-752

A continuous pilot-scale supercritical carbon dioxide system was designed and built for space separation and fractionation up to 400 g/h of anhydrous milk fat. This fat was separated into 5 fractions (S1-S5) in the pressure range 24.1-3.4 MPa at 40-75°C. The solvent/feed ratio was 62 with extraction yield 78%. The short-chain (C4-C5) and medium-chain (C10-C12) fatty acids increased from S1-S5. The long-chain and unsaturated fatty acids (C14-C18) decreased gradually from S1 - S5. The triglycerides followed the same trend as fatty acids. Cholestertol content decreased by 51% and β-D-carotene concn. increased by 145% in the raffinate (SI). AA

1710

Ito (O), Kamata (S), Hayashi (M) and Ushiyama (K). **Milk fat globule membrane substances inhibit mouse intestinal β-glucuronidase.** *Journal of Food Science* 58(4): 1993: 753-755, 796

The effect of cow milk sialoglyciproteins, milk fat globule membrane (MFGM) and *k*-casein on β-D-glucuronidase was studied. Addition of 0.2% MFGM or k-casein led to inhibition of β-D-glucuronidase by 90.0% and 65.8% respectively. MFGM when administered (group I-5%; group II-10%; group III-20%) to mice indicated that the β-D-glucoronidase activity had decreased 15-20% on the 5th day of treatment in group I and II but in group III a decrease in enzyme activity was seen with an inhibition rate of 50%. This showed

the intracolonic efficacy of MFGM in inhibiting β-D-glucuronidase and may be a potential agent in treating or preventing intestinal cancers. GS

1711

Schmidt (K), Lundy (A), Reynolds (J) and Yee (LN). **Carbohydrate or protein based fat mimicker effects on ice milk properties.** *Journal of Food Science* 58(4): 1993; 761-763, 779

Batches of ice milks (2-5% milk fat) made with a carbohydrate- or a protein-based fat mimicker were compared to conventional ice milk (4.8% milk fat). Rheological, freezing and melting properties were evaluated. The carbohydrate-based fat mimicker changed rheological properties, resulting in higher viscosities, greater deviations from Newtonian flow, and higher consistency indices. Less air was incorporated in the mix containing the carbohydrate-based fat mimicker than in the control or the mix with protein-based fat mimicker. The protein-based fat mimicker mix had rheological and melting properties similar to those of the control but achieved higher air incorporation than did the control. AA

1712

Barnard (SE), Ivkovich (M) and Cauller (P). **Processing procedures and sanitation practices to extend the keeping quality of fluid milk.** *Dairy, Food and Environmental Sanitation* 12(2): 1992; 66-68

A list of processing procedures and sanitation practices developed to help fluid milk processing plants achieve acceptable flavour after 12 or more days at 45°F is given. This list was used as part of an educational program by extension in the Food Science Department at Pennsylvania State University in cooperation with processing employees, Pennsylvania Department of Agriculture sanitarians and allied industry representatives. SRA

1713

Khan (S), Ghatak (PK) and Bandyopadhyay (AK). **Heat stability of buffalo milk as affected by phosphate salts addition.** *Indian Journal of Dairy Science* 45(9): 1992; 461-464

Results indicated that max. heat stability (HS) of buffalo milk (BM) occurred at pH 6.6 and 6.5 respectively when milk samples were treated with HCl/NaOH or phosphate salts. The HS of diluted BM was significantly higher than original milk throughout the pH studies. Diluted BM treated with phosphate salts resulted in increase in HS at pH 6.9 and above pH 7.0. Addition of sodium dihydrogen phosphate substantially increased HS of raw, concentrated, reconstituted and concentrated sterilized BM. SRA

1714

Deepa Pande and Mathur (MP). **Isolation of protease active fractions from whey obtained from UHT milk and their purification.** *Indian Journal of Dairy Science* 45(9): 1992; 465-468

The bacterial proteases which are highly thermoresistant are associated with whey fraction (whey proteins) could be successfully isolated and purified from UHT milk to the extent of 2000 fold using the procedure developed. Taking whey as a starting material an enzyme active P_1 fraction was obtained that accompanied whey protein. By solubilizing the enzyme at pH 3.6 fraction P_2 was obtained which gave a highly purified P_3 fraction after dialysis and concn. On gel filtration chromatography P_3 gave two fractions with the purification of 759 and 2045 folds. SRA

1715

Deepa Pande and Mathur (MP). **Storage studies on UHT milk in relation to residual proteases and lipases with particular reference to casein and lipid decomposition.** *Indian Journal of Dairy Science* 45(9): 1992; 469-476

The proteases and lipases survived UHT ranges to a significant level but did not show a consistant trend in the residual activity levels. During storage the protease activity increased but was not the only cause of gelation. The farm produced UHT milk showed better shelf-life than the UHT milk produced under commercial conditions. Raw milk with high psychrotropic activity was unsuited for UHT processing. The lipase appeared to affect the taste and quality of UHT milk during storage. The degradation of casein fractions was correlated with the activity of residual proteases. The lipase surviving UHT ranges was more active at 37°C and acted preferably on short chain fatty acids (mainly C_4). SRA

1716

Uploaksh (K), Malika (RK) and Mathur (DK). **A survey of bacteriological and biochemical quality of sterilized flavoured milks.** *Indian Journal of Dairy Science* 45(11): 1992; 601-606

Sterilized flavoured milk samples showed a max. spore count of 3 per 10 ml initially. There was hardly any variation in the number in replicate samples during storage at 37°C. Acidity increased steadily but not very substantially throughout the incubation period of 9-13 wks. With increase in acidity on storage, a corresponding decrease in pH was recorded. A significant increase in viscosity was

observed in general except during the first wk when it decreased slightly. Proteolysis increased as a function of time. The extent of proteolysis was highest in source B samples (191% after 22 wks) but the rate of proteolysis was max. in source A milk samples especially between 10 and 11 wks. of storage. AA

1717

Dave (RI), Dave (JM) and Sannabhadti (SS). **Antibacterial activity of buffalo milk *dahi* prepared using S. *thermophilus* strains as starter culture.** *Indian Journal of Dairy Science* 45(11): 1991; 607-610

The observations on *in vitro* inhibitory effect of methyl acetone cell free extracts of buffalo milk *dahi* made using 3 strains (MD-2, MD-8 and D-3) of *Staph. thermophilus* against various food poisioning and spoilage type organisms showed that MD-8 culture possessed maximal antibacterial activity against *Bacillus cereus*, *Salmonella typhosa*, *Escherichia coli* and *Staph. aureus* and MD-2, D-3 showed the least antibacterial activity. SRA

1718

Dave (RI), Patel (JR), Sannabhadati (SS) and Dave (JM). **Optimizing conditions of freeze drying for the human strain of *L. acidophilus* LBK14.** *Indian Journal of Dairy Science* 45(12): 1992; 662-666

Growth rate of *L. acidophilus* LBK14 was measured in sterilized skim milk alone (A), plus 1.9% (w/v) sodium β-D-glycerophosphate (B), in skim milk soy blend [(50:50), C] and also in Shankar's (1975) medium before subjecting it to freeze drying. The effect of cryoprotective agents viz., caseitone (5%), malt extract (5%), dimethylsulphoxide (DMSO, 5%) and mono sodium glutamate (MSG, 1.5%) was also studied during and after freezing drying. Culture LBK14 showed stationary phase between 24-36 h in the medium A, B and D while it was between 12-18 h for C. Max. survival of cells after freeze drying was D(36%), followed by A(30%), B(12%) and C(7%). In medium D, MSG gave max. (70%) protection, while with caseitone, malt extract and DMSO it was 65, 51 and 42% respectively. After storage for 60 days also, MSG gave the highest (32%) survival. AA

1719

Surendra Nath (B), Usha (MA) and Rama Murthy (MK). **Proxidant effect of oxidation products of tocopherol in milk fat during storage.** *Indian Journal of Dairy Science* 45(12): 1992; 667-670

Milk fat and its triglycerides were added with oxidation products of tocopherol (OPT) isolated by TLC, at 4, 10 and 20 p.p.m. which corresponded to 10, 25 and 50% of the amounts of naturally occurring tocopherol and were stored at 60°C. The addition of OPT increased the rate of autoxidation of milk fat which was proportional to the amounts of OPT added. Similarly the addition of OPT to cis-linoleic acid methyl ester also enhanced the rate of increase in diene conjugation during storage. The proxidant nature of OPT found in this study explains the observation made that the induction period of milk fat gets terminated even though the major portion of original tocopherol remains intact. The addition of phospholipids and BHT reduced the prooxidant activity of OPT in milk fat, its triglycerides and cis-linoleic acid methyl ester. AA

Milk products

1720

Light (A), Heymann (H) and Holt (DL). **Hedonic responses to dairy products: Effects of fat levels, label information and risk perception.** *Food Technology* 46(7): 1992; 54-57

A study conducted to determine the direct influence of label information on a consumer's hedonic response to two dairy products (American cheese and vanilla ice cream) showed that consumers generally like high-fat dairy products regardless of perceived risk and label information. CSA

1721

Singh (S), Rao (KH), Kanwajia (SK) and Latha Babikhi. **Goat milk products technology - a review.** *Indian Journal of Dairy Science* 45(11): 1992; 572-587

Recently published data on the gross composition and physical properties of goat milk is reviewed. The data showed that cheese is the only product made from goat milk, and limited information is available on the manufacture of fluid milk products, cultured products such as beverage and yoghurt, frozen products, butter, condensed milks, dried milk and certain indigenous products like *khoa*, *chhana*, *paneer* and *ghee*. SRA

Cheese

1722

Hull (R), Toyne (S), Haynes (I) and Lehmann (F). **Thermoduric bacteria: A re-emerging problem in cheese making.** *Australian Journal of Dairy Technology* 47(2): 1992; 91-94

Briefly covers the definition of thermophilic (Tp) and thermoduric (Td) organisms, Td and tp organisms in raw milk, spoilage of Tp microbes of Cheddar cheese made from UF milk, functionality of whey proteins concn. by ultrafiltration and spoilage of traditional

cheeses by Tp and Td microbes, blowing (early and late) of cheeses (Mozzarella, Cheddar and Swiss cheese), soft-body defect in Mozzarella cheese, phenolic flavour in Cheddar cheese, grey spot in low-salt Cheddar cheese, enhanced flavour of cheese due to Td lactic acid bacteria, biogenic amines in low-fat and low salt Cheddar-style and Mozzarella cheeses). The problem of Tp and Td microbes could be controlled by reducing their levels in raw milk, improving manufacturing plant design and sanitation so as to minimise their growth and activity during cheese manufacture and storage. BV

1723

Lehmann (FL). **Thermoduric-thermophilic bacteria in continuous cheesemaking.** *Australian Journal of Dairy Technology* 47(2): 1992: 94-96

Considers the presence and activity of thermoduric (TD) - thermophilic (TP) bacteria in continuous Cheddar cheese production processes of 16-22 h duration discussed include: TD-TP bacteria in Cheddar cheese manufactured by continuous process; source; sites of build-up and minimising their build-up in continuous process Cheddar cheese production. Steps like providing effective cleaning of all unit process reduction of foaming, cleaning of all unit process reduction of foaming, cleaning of holding tanks at frequent intervals of 3-4 h and mini-wash of pasteurizers after 8-10 h continuous operation are suggested. GS

1724

Cromie (S). **Psychrotrophs and their enzymes residues in cheese milk.** *Australian Journal of Dairy Technology* 47(2): 1992: 96-100

The growth of psychrotrophic microorganisms and the activity of their enzymes in raw milk, their effect on the quality and yield of cheese are discussed in this review under the following headings: Psychrotrophic bacteria in milk, enzymes of psychrotrophs (proteinases, lipases) biochemical changes caused by psychrotrophs (proteolysis, lipolysis), effects of psychrotrophs on cheese (yield, quality, starter activity and growth, rennet coagulation time, relationships between bacterial numbers, enzyme levels and defects in cheese) and control of the problem of psychrotrophic bacteria (thermisation of raw milk, controlled or modified atm. storage of milk, activation of the lactoperoxidase system and pre-ripening with lactic acid bacteria). 37 references. BV

1725

Limsowtin (G). **Inhibition of starter cultures.** *Australian Journal of Dairy Technology* 14(2): 1992: 100-102

The paper reviews the cause of starter inhibition in milk (natural milk inhibitors, inhibition resulting from farm, transport and factory handling), how it affects cheese quality and preventive measures to minimise the inhibition (colostrum free milk, antibiotic-free milk, adequate farm hygiene, milk cooling on farms, bulking of milk in silos, phage-free rennet and cooling of bulk starter). GS

Cheddar cheese

1726

Subramanian (P), Mathur (DK) and Malik (RK). **Effect of type of milk and starter culture on organoleptic attributes of Cheddar cheese.** *Indian Journal of Dairy Science* 45(12): 1992: 647-649

The buffalo milk (BMCC) and cow milk (CMCC) Cheddar cheese prepared with CH-9, LF-40 starter were evaluated for body, texture and flavour during 3, 6, 9 and 12 months of ripening. Cheddar cheese prepared with and 12 months of ripening. Cheddar cheese prepared with CH-9 starter had higher scores for body and texture than the cheese prepared with LF-40 at all stages of ripening CMCC with either of the 2 starters over scored the BMCC. The difference was more pronounced at 6 and 9 months of ripening. Both CMCC and BMCC prepared with CH-9 starter obtained higher flavour scores than parallel LF-40 cheeses at different ripening stages. SRA

Mozzarella cheese

1727

Diefes (HA), Rizvi (SSH) and Bartsch (JA). **Rheological behaviour of frozen and thawed low-moisture, part-skim Mozzarella cheese.** *Journal of Food Science* 58(4): 1993: 764-769

Stress relaxation and dynamic profiles of low-moisture, part-skim (LMPS) Mozzarella cheese cylinders refrigerated 14 days (control), frozen and thawed, and stored frozen and refrigerated up to 90 days were compared. Samples were frozen at -30°C and stored at -20°C. Thawing and refrigerated storage were at 5°C. Stress relaxation tests were conducted at 20°C and dynamic spectrometry at 20°C and 60°C. The frozen and thawed Mozzarella cheese tested at 20°C became harder and more elastic with storage time, while refrigerated stored samples became softer and more elasticoviscous with time. Upon melting, both 90-day-frozen and 90-day-refrigerated cheeses were less elastic and less viscous than 14-day-refrigerated samples. AA

1728

Latha Sabikhi, Kanawjia (SK) and Singh (S). **Research developments in Mozzarella cheese**

technology - A review. *Indian Journal of Dairy Science* 45(10): 1992: 497-510

This review covers: physico-chemical properties of different milk systems with respect to cheese manufacture, admixing, standardisation of milk, pasteurisation of milk, acidification of milk, pH levels, use of starter cultures, use of coagulating agent, chemistry of "stretch" of Mozzarella cheese, rennet coagulation of different milk systems, cutting, cooking, stretching and moulding, salting, packaging, preservation and storage, yield of cheese, rheological properties (meltability, stretchability, textural characteristics) and defects in Mozzarella cheese. 109 references. SRA

1729

Latha Sabikhi and Kanawjia (SK). **Effect of admixing of goat and buffalo milks on sensory, compositional and textural characteristics of direct acid Mozzarella cheese.** *Indian Journal of Dairy Science* 45(10): 1992: 562-567

The effect of blending of goat and buffalo milks on direct acid Mozzarella cheese manufacture was investigated. Mozzarella cheese was made from admixtures of goat and buffalo milks in the ratio of 1:3, 1:1, 3:1 and also from 100% buffalo and goat milk for comparison. Cheese made from an admixture of 1:1 yielded the best product. The highest proportion of goat milk resulted in several body and textural defects. The yield decreased with the increased proportion of goat milk. The physico-chemical and rheological characteristics were affected by the goat milk proportion in mixed milk system. The meltability and fat leakage in Mozzarella cheese increased consistently with the increase in goat milk levels. AA

Chhana

1730

Katara (RV) and Bhargava (VN). **Studies on the manufacture of chhana-like product from soymilk-buffalo milk blends.** *Indian Journal of Dairy Science* 45(12): 1992: 656-661

Chhanna prepared from buffalo milk (2.3% fat) admixed with soymilk (20%) of most acceptable quality, which resembled closely with cow-milk chhanna but had a significantly lower fat content. Higher proportion of soy milk upto 30% can be used when the milk has 2% fat. SRA

Gulab jamun

1731

Prajapati (PS), Thakar (PN) and Upadhyay (KG). **Influence of use of pre-soaked *suji* (semolina) on the quality of *gulab jamun*.** *Indian Journal of Dairy Science* 45(11): 1992: 630-632

The use of pre-soaked *suji* as a binder for *gulab jamun* preparation gave significantly ($P < 0.05$) improved flavour and body and texture scores as compared to products obtained with dry *suji* without any adverse effect on the chemical composition. SRA

Khoa

1732

Chaudhari (JG), Upadhyay (KG) and Desai (HK). **Influence of substitution of buffalo milk by sweet cream butter milk on the quality of *khoa*.** *Indian Journal of Dairy Science* 45(11): 1992: 611-619

Buffalo milk was substituted by sweet cream buttermilk (SCBM) at 0 (control), 25, 50, 75 and 100% levels homogenization of *khoa* was done. Incorporation of SCBM resulted in significant decrease in *khoa* yield. Moisture, lactose, titratable acidity, reflectance value, hardness, brittleness, cohesiveness, springiness, gumminess and chewiness decreased significantly with proportion to the SCBM level. Fat, FDM, protein, ash and free fat contents linearly increased. Homogenization significantly improved the yield, increased moisture content. The resultant *khoa* was softer, less brittle, springy, chewy, more cohesive and gummy. Addition of SCBM upto 50% did not alter the flavour, but 75% addition attributed to presence of pronounced cooked flavour substituting 25% buffalo milk with SCBM showed no adverse effect on overall sensory quality and reduced the raw material cost. Homogenization could be used to reduce the free fat content and improve the sensory characteristics of *khoa*. SRA

1733

Dodeja (AK), Abichandani (H), Sarma (SC) and Dharam Pal. **Continuous *khoa* making system - design operation and performance.** *Indian Journal of Dairy Science* 45(12): 1992: 671-674

This continuous *khoa* making system offers - higher heat transfer coeff., absence of fouling on heat transfer surface, no necessity of preconcentrating the feed in evaporators, high capacity reduction, low product inventory; extremely small hold up value, equipment adaptable to automation and cleaning in place, sanitary operation, as process takes place in a completely closed system, no strain on operators due to few values, uniform product quality, waste heat recovery (energy conservation) and tremendous industrial potential. SRA

Paneer

1734

Pal (MA) and Yadav (PL). **Effect of fat level on the quality of *paneer* from various blends of buffalo and cow milk.** *Indian Journal of Dairy Science* 45(10): 1992: 554-561

Buffalo and cow milk was blended in 3 different proportions viz., 3:1, 1:1 and 1:3, with each blend standardized to 3 different fat levels viz:, 6.0, 3.5 and 1.5%. The *paneer* was also made from standardized cow and buffalo milk for comparison. The study revealed that the fat level has a highly significant effect ($P < 0.01$) on moisture, fat, protein, ash, total solids, fat on dry matter basis, yield, total solids, recovery and shear strength of *paneer*. Among the sensory characteristics all the parameters studied i.e. appearance, body and texture, odour, taste and overall acceptability were significantly affected ($P < 0.01$) by the fat level in milk. Among the whey characteristics fat level had a significant effect ($P < 0.01$) on the fat and total solids in whey. Fat levels was found to have no significant effect on the parameters like lactose content, moisture abdsorption, titratable acidity, pH and coagulant amount required in *paneer*. pH of whey was also found to remain unaffected by the level of fat in the milk. The results indicate that a milk fat level of 3.5% and FDM content of 40-42% as against the legal requirement of 50% are adequate enough to produce a good quality *paneer*. AA

Quarg

1735

Nakazawa (Y), Furusawa (M), Hohno (H) and Oishi (H). **Biochemical changes during fermentation of quarg manufactured from milk concentrated by ultrafiltration and evaporation.** *Indian Journal of Dairy Science* 45(9): 1992: 477-485

Whole milk was preconcentrated for quargmaking by ultrafiltration (UF) and evaporation (EV). Distribution of Na, K, Mg and Ca between a higher ratio of colloidal state (76-90%) and a lower ratio of soluble state (11-25%) in UF conc. was considered abnormal. The EV conc. showed slightly higher stability of the state of minerals. The initial Ca/protein ratio was 0.0363 (the control), 0.0354 (the EV) and 0.0352 (the UF). In addition, the initial colloidal/soluble ratios of minerals must be revealed to a significant effect on the fermentation, coagulation and rheological function. Consequently, UF caused significant changes in proteolysis of various nitrogenous compounds, lower mol. wt. peptides and amino acids of quarg. The hydrolysing rate of protein of the control, EV and UF, after fermentation at 30°C for 12 h, showed 10.16%, 10.13% and 9.42%, respectively. However, the changes in particle size distribution, as the results of UF and EV may not be responsible for the changes in proteolysis. The sensory evaluation of the control yielded excellent results, whereas that of the UF and EV quarg achieved only somewhat lower scores. The EV quarg showed slightly higher scores than the UF quarg. AA

Rasogolla

1736

Vaghela (MN), Jana (AH) and Upadhyay (KG). **Utilization of whey in the preparation of cooking medium for *rasogolla*.** *Indian Journal of Dairy Science* 45(12): 1992: 650-655

Rasogolla was prepared using chhanna whey, with or without neutralization and cheese whey, 45, 50 and 55% sugar levels and 55% sugar syrup (control). All the whey-sugar syrups exhibited excellent foaming ability prolonged cooking period as compared to control syrup. *Rasogolla* cooked in control syrup had significantly higher fat, protein and TS and significantly lower sucrose. Higher sugar levels in the samples increased the hardness and elasticity. Whey system produced softer, less elastic product with improved colour and appearance, and less susceptible to browning upon successive cooking in the same syrup. Unneutralised chhanna whey with 50% sucrose is recommended as a cooking medium for rasogolla making with savings in 5% sugar requirement and with improved body texture. This syrup could be used repeatedly for three cookings without having any adverse effect on the quality of the product. SRA

Milk proteins

1737

Barbut (S) and Foegeding (EA). **Ca^{2+}-induced gelation of pre-heated whey protein isolate.** *Journal of Food Science* 58(4): 1993: 867-871

Addition of $CaCl_2$ to pre-heated whey protein isolate (WPI) suspensions caused an increase in turbidity when pre-heating temp. were greater than or equal to 64°C. Pre-heating to greater than or equal to 70°C was required for gelation. WPI suspensions which contained $CaCl_2$ became turbid at 45°C and formed thermally induced gels at 66°C. Thermally and Ca^{2+}-induced gels showed significant time/temp. effects but the penetration force values in the Ca^{2+}-induced gels were always lower. However, Ca^{2+}-induced gels were higher in shear stress at fracture. The Ca^{2+}-induced gels had a fine-stranded

protein matrix that was more transparent than the thermally induced gels, which showed a particulate microstructure. AA

MEAT AND POULTRY

Meat

1738

Kesava Rao (V), Kowale (BN) and Sharma (R). **Dehydrated meats.** *Poultry Guide* 30(6): 1993: 54-57

Transportation of meat preserved by refrigeration, drying, smoking, salt etc. is easy and practical. Details on different dehydrated meats like dry salted meat, dried beef; meat bars; traditional dried meat products (viz. Bilton, Charqui, Rapka, Pemmican, Kavurma, Pastirma, Sucuk); smoked meats; cured meats; ready-to-eat meat powder; the problems associated with dehydrated meat spoilage such as moisture sensitivity, oxygen sensitivity, light sensitivity, mechanical abrasions, flavour contamination and insect attack; and better packaging techniques of freeze-dried meats, soup mixes, meat bars, dry sausages and ready-to-eat meat powder; and net protein utilization values for different dehydrated meat are presented. GS

1739

Han (D), McMillin (KW), Godber (JS), Binder (TD), Younathan (MT), Marshall (DL), Hart (LT). **Iron distribution in heated beef and chicken muscles.** *Journal of Food Science* 58(4): 1993: 697-700

Iron distribution in 6 fractions (water-soluble, water-insoluble, diffusate, hematin, total heme, and ferritin) of beef and chicken muscles heated to 55, 70, 85 and 100°C was determined. Fe content decreased in water-soluble fractions and increased in water-insoluble fractions as temp. increased from 27°C to 100°C. Heme Fe decreased more from 55 to 85°C than from 27 to 55°C or 85 to 100°C. Heat decreased the content of heme Fe and extractable ferritin Fe and increased the amount of diffusate Fe. Rapid development of oxidative rancidity in cooked meat might be due to increased diffusate Fe by heating. BV

1740

Townsend (WE), Searcy (GK), Davis (CE) and Wilson (RLJr). **End-point temperature (EPT) affects N-acetyl-β-D-glucosaminidase activity in beef, pork and turkey.** *Journal of Food Science* 58(4): 1993; 710-712, 716

Little loss of NAGase activity was noticed in beef, pork, turkey breast and ground turkey leg muscle tissue when heated to 40°C, but as EPT increased from 40 - 70°C, there was ($P < 0.05$) loss of activity. At 70°C, 90% of the NAGase activity was lost in beef, 98% in pork, and 93-98% in turkey. Inactivation temp. values IT_{50}, (50% inactivation) were: beef 59.8°C; pork 53.4°C, turkey breast 55.6°C; and turkey leg 56.6°C. GS

1741

Toldra (F), Cervero (M-C) and Part (C). **Porcine aminopeptidase activity as affected by curing agents.** *Journal of Food Science* 58(4): 1993: 724-726, 747

The effect of common curing agents (salt, nitrate, nitrite, ascorbic acid and glucose) on porcine muscle leucyl, arginyl, alanyl, pyroglutamyl and tyrosyl hydrolysing activities was studied. Salt, ascorbate and nitrite had inhibitory effects on most enzyme activities. All activities decreased as salt increased (to 1.25 M) and/or a_w decreased (from 1.00 to 0.81). Nitrite inhibited only alanyl, pyroglutamyl and tyrosyl hydrolyzing activities. An *in-vitro* study using model conditions of 3 stages of dry-cyring of ham, revelaed that leucyl hydrolyzing activity may be important through the complete process. Other enzymes may also be involved in later stages of curing but are less important. AA

1742

Takahashi (K) and Hattori (M). **Edible meat casing from reconstruction of collagen-Elastin matrix.** *Journal of Food Science* 58(4): 1993; 734-738

Pepsin-solubilized elastin (PSE) was prepared from insoluble elastin (IE) preparation by digesting it with pepsin (IE:pepsin, 100:1 (w/w)] at 25°C for 5-30 h prior to dialyzing against water and lyophilizing. PSE showed amino acid compositions similar to that of IE and relative mol. wt. (Mr) of 6-640 x 10^3. PSE accelerated the matrix reconstruction of pepsin-solubilized collagen (PSC) and reduced the redissolution of the PSC matrix under several solvent conditions. PSE elevated the matrix thermal denaturation temp. from about 50°C to 55°C, leading to decreased breaking strength and reduced elongation of the PSC film, as compared with the control. AA

1743

Rousset (S) and Renerre (M). **Effect of CO_2 or vacuum packaging on normal and high pH meat shelf-life.** *International Journal of Food Science and Technology* 26(6): 1991; 641-652

In order to extend meat shelf-life, normal-pH and high-pH beef steaks were packaged under vacuum

or in 100% CO_2 atm. Microbiological, colour (L^*, a^*, B^*) and reflectance (R_{630} - R_{580} values) characteristics were measured. After packaging under vacuum, *Enterobacteriaceae*, *Brochothrix thermosphacta* and *Pseudomonas* numbers were 10- and 100-fold greater on high-pH meat than on normal-pH meat. Packaging under CO_2 improved the shelf-life of meat, particularly that of high-pH meat up to 42 days. For both high- and normal-pH meats, the bacterial flora was composed only of lactic acid bacteria. Normal-pH meat in CO_2 atm. and vacuum packaging had a purple colour. After CO_2-pack opening the meat colour became bright red and R_{630} - R_{580} measurements were high, whereas after opening of vacuum packaging R_{630} - R_{580} decreased rapidly with increasing aerobic exposure. High-pH meat became paler with increasing storage time in CO_2. Simultaneously R_{630} - R_{580} values increased and the pH fell. In addition it lost less exudate and oxidized less in air than the normal-pH meat under the same conditions. AA

1744

Davey (KR). **Theoretical design analysis for a new instrument for the measurement of lean content of cartoned boneless meats.** *International Journal of Food Science and Technology* 26(6): 1991: 673-681

The theory for a new instrument for the on-line (batch continuous), and *in situ* measurement of the per cent chemical lean content (CL) of whole cartons of boxed, boneless meats is outlined. This idealized instrument should be non-invasive of the carton and non-destructive of its meat content. A practical predictive model for CL is presented, based on a proposed novel method of meat vol. detn. and the established difference in density of the two components of meat, lean (i.e. fat free) and fat. The importance of simplifying assumptions and potential practical realization are discussed. Other potential applications to two-component systems are briefly discussed. AA

Beef

1745

Eilert (SJ), Blackmer (DS), Mandigo (RW) and Calkins (CR). **Meat batters manufactured with modified beef connective tissue.** *Journal of Food Science* 58(4): 1993; 691-696

The properties of meat batters prepared at various fat levels (8, 16 and 24%) and modified beef connective tissue (MCT) levels (0, 10, 20, 30 and 40%) is reported. Addition of MCT is effective in reducing yield losses in low-fat meat batters without major changes in batter stability. Increasing levels of MCT increased batter pH, emulsification temp. increase, batter extrusion values and collagen levels in meat. Thermal processing yield losses declined with increased MCT level. GS

1746

Lanari (MC), Cassens (RG), Schaefer (DM) and Scheller (KK). **Dietary vitamin E enhances colour and display life of frozen beef from Holstein steers.** *Journal of Food Science* 58(4): 1993; 701-704

Dietary vitamin E supplementation increased colour stability of frozen *Longissimus lumborum* samples kept at -20°C. Illumination and vacuum packaging increased colour changes in beef. GS

1747

Huff (EJ) and Parrish (FCJr). **Bovine longissimus muscle tenderness as affected by postmortem aging time, animal age and sex.** *Journal of Food Science* 58(4): 1993; 713-716

Increased postmortem aging time improved the tenderness of beef striplion regardless of sex or age of animal. GS

1748

Xiong (YL) and Blanchard (SP). **Functional properties of myofibrillar proteins from cold-shortened and thaw-rigor bovine muscles.** *Journal of Food Science* 58(4): 1993; 720-723

Frozen bovine muscles that underwent severe contraction at thawing showed greater protein extractability (35%) than muscles stored at 0 and 15°C (27% extractability) of the three tempered muscles, thaw-rigor muscles produced the strongest myofibril gel and cold-shortened muscle formed the most elastic SSP gel. GS

1749

Lanari (MC) and Zaritzky (NE). **Effect of packaging and frozen storage temperature on beef pigments.** *International Journal of Food Science and Technology* 26(6): 1991; 629-640

The influence of final freezing and storage temp. on pigment modifications of beef samples wrapped in polyethylene and EVA/SARAN/EVA was analysed. Metoxy-and myoglobin relative surface concn. were determined using reflectance spectrophotometry. Pigment behaviour during storage of beef packaged in both films and oxygenation of vacuum-packaged samples was described by different reaction schemes and modelled to obtain kinetic and equilibrium constants. Comparative studies performed with beef samples (a) refrigerated, (b) frozen to -5°C and stored at this temp. (partial

freezing), and (c) frozen to -25°C and stored at -5 and -20°C, indicated that for aerobic storage periods of 90 days, metmyoglobin levels of partially frozen samples upon thawing were comparable to those of frozen samples stored at -20°C. For vacuum-packaged beef, pigment concn. remained practically constant during frozen storage; partial freezing increased oxygenation capacity of the tissue compared with chilled and frozen conditions. AA

1750

Davey (KR) and Lovett (DA). **Evaluation of a pilot on-line instrument for the measurement of lean content of cartoned boneless beef.** *International Journal of Food Science and Technology* 26(6); 1991; 683-693

A lab. evaluation of a pilot, new instrument for the on-line (batch continuous) measurement of the per cent chemical lean content (CL) of whole cartons (nominally 27.2 kg) of boneless beef, based on an idealized design, is reported. For 24 cartons obtained from an export meatworks there was a highly linear ($P < 0.001$) dependence of CL on (reciprocal of) the instrument reading. The standard deviation of the predicted CL about this regression line was 2.02. For a further 20 cartons in which the cardboard was equilibrated at high RH prior to packing with the meat, the standard deviation in CL was 3.14. Predictions for CL were not significantly influenced by the order in which the meat pieces were packed into the carton, but were significantly ($P < 0.001$) affected by the size of the meat pieces. Best results of predicted CL were obtained with large meat pieces in cartons as supplied from the meatworks. These findings together with the fact that model predictions were not improved by a temp. term for meat (range 8.7 - 15.7°C) should augur well for future development of the instrument. AA

Pork

1751

Bloukas (JG) and Paneras (ED). **Substituting olive oil for pork backfat affects quality of low-fat frankfurters.** *Journal of Food Science* 58(4); 1993; 705-709

Among the low-fat frankfurters the 12% protein frankfurters compared to the control (27.6% animal fat and 10.9% protein) had similar ($P > 0.05$) sensory attributes higher ($P < 0.05$) skin strength and improved texture except for palatability that with 10% protein treatment had undesirable colour and was very soft. That with 14% protein had the same ($P > 0.05$) red colour as the control but higher ($P < 0.05$) firmness, skin strength and textural traits and lower ($P < 0.05$) juiciness. GS

1752

Thayer (DW), Boyd (G) and Jenkins (RK). **Low-dose γ-radiation and refrigerated storage in vacuo affect microbial flora of fresh pork.** *Journal of Food Science* 58(4); 1993; 717-719, 733

Vacuum-packaged ground fresh pork samples absorbed gamma radiation doses of 0, 0.57, 1.91, 3.76, 5.52 or 7.25 kGy at 2°C. Samples were analyzed after 1, 7, 14, 21, 28 or 35 days storage at 2°C for presence and number of aerobic and anaerobic mesophiles and endospore formers, and aerobic psychrotrophs. Conventional plate counts did not detect surviving microflora in any sample that received an absorbed dose of 1.91 kGy or higher, even after refrigerated storage for up to 35 days. The microflora in the control were predominantly Gram-positive for the first 21 days; however, *Serratia* predominated at 28 and 35 days. *Staphylococcus*, *Micrococcus*, and yeast species predominated in samples that received 0.57 kGy. AA

Poultry

Chickens

1753

Xiong (YL). **A comparison of the rheological characteristics of different fractions of chicken myofibrillar proteins.** *Journal of Food Biochemistry* 16(4); 1993; 217-227

Suspensions of myofibrils and salt-soluble (SSP) or insoluble (SIP) proteins of chicken breast muscle in 0.6 M NaCl at pH 6.0 were heated to induce gels. Dynamic oscillating measurments showed multiple transitions in the shear storage modulus and loss modulus for all 3 protein fractions in the temp. range of 40-65°C. However, changes in these viscoelasticities were most pronounced for SSP and least appreciable for SIP. Gel penetration test also revealed a descending order of SSP > myofibrils > SIP in gel strength. The 3 fractions of myofibrillar proteins appeared to follow a similar gelation mechanism but vary in the density of the gel networks. AA

1754

Gray (R) and Stevenson (MH). **Effect of dose rate and length of storage on the ESR signal strength in irradiated chicken bone.** *International Journal of Food Science and Technology* 26(6); 1991; 669-672

One hundred and twenty five pairs of chicken drumsticks were randomly allocated to one of 5

doses rates: 5, 10, 15, 20 or 600 kGy h^{-1}. The highest dose rate was obtained using a linear accelerator whilst the remaining dose rates were provided using a ^{60}Co gamma source. Each batch of 25 pairs was further divided into groups 5 of which were stored at 4°C for 0, 7, 14, 21 or 28 days. ESR spectroscopy was used to measure the intensity of the radiation-induced signal. There was a quadratic relationship between ESR signal strength and dose rate, which although statistically significant is unlikely to be of practical importance. The magnitude of the ESR signal declined by about 20% over the first 14 days of storage at 4°C and thereafter the decrease was minimal. AA

Products

Eggs

1755

Horikoshi (T), Hiraoka (J), Saito (M) and Hamada (S). **IgG antibody from hen egg yolk: Purification by ethanol fractionation.** *Journal of Food Science* 58(4): 1993: 739-742, 779

A procedure was developed for large-scale preparation of IgG antibodies from egg yolks. The supernatant from egg yolks was obtained after an initial 9-fold dilution with water. The lipids in the supernatant were then almost completely eliminated from the water-soluble protein fraction containing the antibody, by precipitation with 60% ethanol and filtration. Yolk antibody was purified from the lipid-free water-soluble protein fraction by ethanol fractionation at final concn. 30% (pH unadjusted), and again at 25% (pH 7.4). The purified fraction was composed of > 99% pure IgG. Recovery of antibody was calculated as 40%. AA

1756

Koketsu (M), Juneja (LR), Kim (M), Ohta (M), Matsuura (F), Yamamoto (T). **Sialyloligosaccharides of delipidated egg yolk fraction.** *Journal of Food Science* 58(4): 1993: 743-747

The major sialyloligosaccharide moietics of water-soluble fraction of delipidated egg yolk (DEY) were isolated and characterized. They were of the biantennary complex type which account for about 33.6% of the total sialyloligosaccharide. The total sialyloligosaccharides, from the water-soluble DEY fraction, were about 47.7% monosialyl and 50.6% disialyloligosaccharides. GS

Turkeys

1757

Lavelle (CL) and Foegeding (EA). **Gelation of turkey breast and thigh myofibrils: Effects of pH, salt and temperature.** *Journal of Food Science* 58(4): 1993: 727-730, 760

Salt concn. > 0.1 M and pH were important to the development of gel fracture properties. However, meat type and salt concn. (0.5 - 1.0 M) did not influence gel shear stress or shear strain. Isothermal heating temp. (55°C or 70°C) affected only gel shear strain. Rheological properties at fracture and nonfracture did not respond alike to changes in gelation conditions. General similarities between breast and thigh myofibril gels implied that protein isoforms were not the main factor influencing gel structure formation. AA

1758

Flores (NC), Clarke (AD) and Hsieh (FH). **Extrusion processing of rice or corn flour with mechanically deboned turkey.** *Journal of Food Quality* 15(6): 1992: 399-408

Rice flour, yellow or white corn flour at 50, 60 and 70% levels and mechanically deboned turkey were extruded at 104 and 120°C. Warner-Blatzler shear values were significantly high for treatments with 70% corn flour; TBA values were greater with corn flour level and low temp. extrusion. Extrusion resulted in moisture loss and high temp. processing showed mixed results on ether-extractable compounds. SD

1759

Calvert (JT) and Decker (EA). **Interactions between carnosine and selected antioxidants in ground turkey.** *Journal of Food Quality* 15(6): 1992: 423-433

The antioxidant activity of carnosine (0.5%) alone and in combination with selected antioxidants was investigated in uncooked ground turkey stored at 4°C. Tocopherol (0.05%) and carnosine (0.5%) showed antioxidant activity in salted and unsalted ground turkey; ascorbyl palmitate (AP) (0.05%)/carnosine (0.5%) combination decreased thiobarbituric acid reactive substances 1.5 fold in salted ground turkey and sodium tripolyphosphate (0.5%) or citrate (0.01 or 0.05%) and carnosine (0.5%) did not increase the antioxidant activity of carnosine in ground turkey. The result indicate that tocopherol and AP could enhance the antioxidant activity of carnosine. SD

1760

Lynch (JA), Macfie (HJH) and Mead (GC). **Effect of irradiation and packaging type on sensory quality of chill-stored turkey breast fillets.**

International Journal of Food Science and Technology 26(6): 1991; 653-668

A panel of experienced assessors was used to test the effect of irradiation at 2.5 kGy (250 krad) on the sensory quality of 1-day and 21-day old turkey breast fillets stored at 1°C in either oxygen-permeable polyethylene or an oxygen-impermeable barrier film. In the application of Free Choice profiling and Generalized Procrustes Analysis, assessors used their own terms to describe the appearance, odour and flavour of the samples. The irradiated samples showed negligible growth of microorganisms across 21 days of storage. Radiation treatment resulted in an intense pink colour in the raw and cooked samples, which was maintained during storage in oxygen-impermeable film, but decreased in samples exposed to oxygen during storage. Radiation also produced a set of unpleasant raw odour notes variously described as sour, rancid, mature, bad meat or putrid in the samples stored in oxygen-impermeable film. These notes were unlike the sulphurous notes previously associated with protein denaturation in irradiated chicken and were apparently distinct from the odour notes that developed in corresponding non-irradiated samples. AA

SEAFOODS

1761

Rathna Kumar (K) and Jayachandran (P). **Chitin - a versatile bio polymer from Crustascean shell wastes.** *Seafood Export Journal* 25(4): 1993: 19-21

1762

Bhaskaran Nair (P). **Quality control for export of marine products.** *Seafood Export Journal* 25(4): 1993: 23-31

Deals with the Quality Control Act by Government of India for fish and fishery products viz., the Quality Control and Inspection in approved units, In-process quality control, Self-certification: Canadian guidelines for chemical contaminants/bacteriological organism: ES FDA regulatory requirements and Standards of seafoods under the Food Sanitation Law in Japan and Australia. The importance of food standards for marketing of fish and for the effective application of quality control laws are emphasised. The need for a well documented process control of cooking, cooling, cleaning, freezing, glazing, weighing, packaging, lebelling, storage, distribution and waste disposal as a prequisite for quality management system is emphasised. GS

1763

Gopakumar (K). **Marketing of value added products.** *Seafood Export Journal* 25(5): 1993: 25-27, 29, 31-33

Value added convenience form marine products based on shrimp, lobster, squid, cuttle fish, bivalves, certain sp. of fish and minced meat from low priced fish for export and internal markets are identified. Battered and breaded products, prawn products, squid rings, stuffed squid, clam products, fish fillets, fish fingers, fish cutlets, fish patties, quick frozen products, butter sandwiched prawn, minced meat, surimi, Kamaboko products, fish sausage and fish salads are briefly described. GS

Crabs

1764

Dionysius (DA), Hoek (KS), Milne (JM) and Slattery (SL). **Trypsin-like enzyme from sand crab (*Portunus pelagicus*): Purification and characterization.** *Journal of Food Science* 58(4): 1993: 780-784, 792

Purification and characterization of one of the major proteinases responsible for the tissue softening in sand crab (*P. pelagicus*) was attempted. The enzyme was a trypsin-like serine proteinase with a mol. wt. of 25,000 (estimated by gel filtration and mass spectroscopy) and 34,800 (estimated by SDS-PAGE). The optimum temp. for hydrolysis of azocasein was 60°C while inactivation of 50% enzymic activity occurred at 68°C. The enzyme is useful in food applications requiring a heat-stable proteinase and the results also help to understand and avoid problems of meat softening during storage of seafood products. GS

Perwinkles

1765

Ariahu (CC) and Ilori (MO). **Use of perwinkles as sources of dietary protein: The nutritional, toxicological, processing and policy implications.** *Food Reviews International* 8(2): 1992: 223-233

Perwinkles (Littorina, Lacuna, Pachymelania and Tympanostomus spp) are potential source of good-quality proteins. It contains most of the essential amino acids in adequate amount for human nutrition. This paper reviews the nutritional qualities, health implications of its consumption, processing (traditional methods, options for improved preservation and policy implications. 36 references. BV

Shrimps

1766

Dondero (M), Egana (W), Tarky (W), Cifuentes (A) and Torres (JA). **Glucose oxidase/catalase improves preservation of shrimp (*Heterocarpus reedi*).** *Journal of Food Science* 58(4): 1993: 774-779

The preservative effect of glucose oxidase (GOX) and catalase (CAT) in a 4% glucose aqueous solution were evaluated on shrimp stored at 0 - 2°C. On-board and immediately after catch, shrimp were washed with tap water at 10°C, and dipped or kept in the enzyme solution. Microbial (total psychrotrophs and *Pseudomonas* spp. counts), chemical (total volatile bases, ammonia and pH) and sensory tests (whole-raw and cooked-peeled samples) showed that holding shrimp in the GOX/CAT/glucose solution retarded microbial spoilage and preserved quality more effectively than dipping shrimp in the same solution. The importance of treating shrimp as early as possible was demonstrated by comparing shrimp treated 4 and 82 h after catch. AA

Fish

1767

Yoo (B) and Lee (CM). **Rheological relationships between surimi sol and gel as affected by ingredients.** *Journal of Food Science* 58(4): 1993: 880-883

Rheological properties of surimi sol showed that consistency index (K) was surimi concn.-dependent, as it decreased with increased level of ingredients except for carrageenan which increased K value. The flow behaviour index and textural properties appeared to be a function of type and level of ingredients. Unlike starch and synergistic carrageenan, egg albumen, oil and i-carrageenan did not show a composite reinforcing effect. K values measured by rotational cylindrical spindle viscometry more closely correlated with textural properties (r = 0.87 for compressive force; r = 0.87 for shear force) than did other viscometries studied. AA

Catfish

1768

Thed (ST) and Erickson (MC). **Absorption of dissolved ascrobate by live channel catfish (*Ictalurus punctatus*).** *Journal of Food Processing Preservation* 16(3): 1992: 185-192

Live channel catfish were exposed to 0.3% sodium ascorbate sol. at pH 5. Ascorbic acid concn. in the fillets was found to increase from 13 p.p.m. initially (control group) to 51 p.p.m. and 43 p.p.m. for fish exposed to ascrobate for 8 and 24 h, respectively. For the group of fish exposed to 8 h of ascorbate followed by 16 h of dechlorinated water, pH 7, the fillets contained 27 p.p.m. ascorbic acid. Fish which were exposed to water (without ascorbate) at pH 5 for 24 h showed a comparable ascrobic acid level in fillets to those fillets from the control group. The absorption of ascorbate via gills and/or intestines and distribution to required sites within the muscle tissue could serve to increase the stability of the fish fillet during subsequent processing and storage. Introduction of water-soluble antioxidants to aquacultured fish species by this approach requires further exploration. AA

1769

Huang (YW), Koehler (PE), Eitenmiller (RR) and Lillard (DA). **Effects of film over wrapping, vacuum packaging and vacuum skin packaging on psychrotrophic counts and chemical changes of iced channel catfish.** *Journal of Food Processing Preservation* 16(3): 1992: 205-213

Microbial and chemical changes during iced storage of fillets from channel catfish (*Ictalurus punctatus*) with film overwrapping, vacuum packaging, or vacuum skin packaging were determined by psychrotropic plate counts, thiobarbituric acid (TBA), free fatty acid, pH, and ammonia production. Vacuum-packaged fish had significantly lower ($p < 0.05$) psychrotrophic bacteria counts than overwrapped fish. A significantly higher free fatty acid content was also observed after week two in overwrapped samples. However, vacuum-packaged catfish had the same pH, TBA number, and ammonia production as overwrapped fish on the sampling days throughout 3 wks of storage. AA

Sardines

1770

Tsukamasa (Y), Sato (K), Shimizu (Y), Imai (C), Sugiyama (M), Minegishi (Y), Kawabata (M). **ε-(γ-Glutamyl)lysine crosslink formation in sardine myofibril sol during setting at 25°C.** *Journal of Food Science* 58(4): 1993: 785-787

The quantitative change of ε-(γ-glutamyl)lysine (EGL) crosslink and relationship between crosslink content and gel-strength were examined on salt-ground myofibril sol from sardine (*Sardinops melanostictus*) during incubation at 25°C. In the presence of EGTA, no EGL crosslinks were detected

in myofibril sol and gelation did not occur. The EGL crosslink content and breaking strength of gels increased in proportion to incubation time. High correlation was observed between the logarithm of breaking strength and logarithm of EGL crosslink content (r = 0.987). The EGL crosslinks formed by transglutaminase are important in the setting of sardine meal sol. at < 30°C. AA

Sea scallop

1771

Chung (SL) and Merritt (JH). **On-board handling and freezing of the sea scallop, *Placopectem magellanicus*.** *International Journal of Food Science and Technology* 26(6): 1991: 695-705

The effects of on-board handling and freezing on the quality of meats from the sea scallop, *P. magellanicus*, in the Atlantic Canadian fishery were investigated. The results show that meals frozen within 6 h of catching, pre-rigor, were markedly superior to meats frozen after storage in ice for up to 10 days, with lower drip loss, more tender texture, less flavour loss and higher overall acceptability. Inferior results were obtained without pre-chilling of the meats before storage in cotton bags in melting ice and with live holding for 3 days followed by freezing and storage at -30°C for up to 6 months. Days in ice before freezing, however, exerted by far the greatest influence on quality. According to these results, freezing on board warrants consideration on grounds of superior quality including increased yield of cooked product. AA

Snapper

1772

LOwe (TE), Ryder (JM), Carragher (JF) and Wells (RMG). **Flesh quality in snapper, *Pagrus auratus*, affected by capture stress.** *Journal of Food Science* 58(4): 1993: 770-773, 796

Muscle metabolites in resting, tank acclimated snapper, *P. auratus*, were monitored for 72 h postmortem and compared with values from excercised or commercially caught fish. The physiological status of the live animal was quantified by plasma cortisol and blood chemistry. Cortisol levels were lowest in unstressed controls (6.8 plus or minus 2.1 ng mL^{-1}) while excercised lab. fish had highest levels (67.7 plus or minus 11.2 ng mL^{-1}). Control fish maintained a constant K-value for 72 h in chilled storage; all other groups had significant increases. Onset of rigor development and muscle ATP depletion was delayed in unstressed fish and was more rapid in line-captured than exercised fish. Commercial users minimizing stress would maintain high flesh quality. AA

1773

Michel (I), Lavigne (C) and Desrosiers (T). **Soluble and lipid-bound calcium and zinc during processing of infant milk formulas.** *Journal of Food Science* 58(4): 1993: 756-760

The extent to which each step during the manufacture of infant milk formulas affected soluble and lipid bound Ca and Zn, was determined by an *in vitro* digestion method. The proportions of soluble and lipid-bound Ca and Zn throughout the manufacture of powdered and liquid infant milk formulas were determined and the properties of soluble and lipid bound Ca and Zn in various milk samples were compared with those in human milk. Pasteurization did not reduce solubility of Ca and Zn. The solubility of Ca and Zn was lower in sterilized and spray dried formulas than in blends forewarmed at low temp. Initial Ca and Zn levels were greater in infant formulas than in human milk. GS

1774

Paul (SC) and Mathur (BN). **Development of low-lactose infant formula. Part II. Physico-chemical characteristics of life in relation to degree of lactose hydrolysis.** *Indian Journal of Dairy Science* 45(10): 1992: 540-546

1775

Paul (SC) and Mathur (BN). **Development of low lactose infant formula. Part III. Storage related changes in the physical properties.** *Indian Journal of Dairy Science* 45(10): 1992: 547-553

This investigation was directed at the comparative evaluation of the storage behaviour of a 'low-lactose infant formula' (LIF) with three levels of lactose hydrolysis, viz., 20, 35 and 50% of lactose. The colour characteristics, as revealed by the reflectance spectra were found to marginally intensify in the region of 570-800 mm with the progress of the storage period. In samples of LIF having higher degree of lactose hydrolysis, intensification of the colour specter was greater during storage at 37°C. However, colour appearance of the LIF with even 50% of lactose hydrolysis was acceptable visually upto 1 yr of storage. The flowability and dispersibility of LIF samples was not affected by the degree of lactose hydrolysis, following a linear trend of marginal changes during storage. On the other hand, wettability sinkability and solubility index of the LIF samples was significantly influenced by the degree of lactose hydrolysis. These reconstitution characteristics followed a linear change during one

of storage at 37°C and could be mathematically modelled. Regardless of the degree of lactose hydrolysis, all samples of LIF conformed to the standards of acceptability for reconstitution characteristics upto 1 yr of storage at 37°C. AA

Infant foods

1776
Paul (SC) and Mathur (BN). **Development of a low-lactose infant formula. Part I. Formulation aspects.** *Indian Journal of Dairy Science* 45(10): 1992: 532-539

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

1777
Stillman (JA). **Colour influences flavour identification in fruit-flavoured beverages.** *Journal of Food Science* 58(4): 1993: 810-812

The influence of colour on flavour was investigated using 310 untrained volunteers who each judged the flavour of 1 of 8 beverages. Artificially flavoured raspberry and orange beverages were either left incoloured, or coloured red, orange or green. Colour had a significant influence on the identification of both flavours, although every combination of colour and flavour was identified correctly beyond the level expected by chance. Performance was degraded equally when beverages were uncoloured, and facilitated equally when beverages were appropriately coloured. Unusual colour-flavour combinations reduced the identification of raspberry flavour more than that of orange flavour. The influence of colour was particularly salient because tasters were aware that the colour of the beverage might be inappropriate to its flavour. AA

1778
Giese (JH). **Hitting the spot: Beverages and beverage technology.** *Food Technology* 46(7): 1992: 70-72, 74-75, 78-80

The primary ingredients such as water, sweeteners (monosaccharides, sucrose, mixed carbohydrate syrups, sorbitol); intense sweeteners (aspartame, acesulfame-K, alitame, sucralose, saccharin, stevioside); flavourings (natural extracts, nature-identical falvours, artificial flavouring compounds); acids (citric acid, phosphoric acid, malic acid); preservatives; colouring and their production techniques used in the production of carbonated and non-carbonated beverages are described. The article also examines some new beverage products such as non-carbonated fruit beverages, carbonated beverages, iced coffee and tea and sports or isotonic beverages. CSA

Alcoholic beverages

Wines

1779
Cardwell (TJ), Cattrall (RW), Chen (GN), Scollary (GR) and Hamilton (IC). **Determination of free sulphur dioxide in red wine by alternating current voltammetry.** *Analyst (London)* 116(3): 1991: 253-256

A phase-selective second harmonic A.C. voltammetric procedure (VP) is reported for the detn. of free SO_2 in red wine. The A.C VP is recommended as an alternative to the spectrophotometric procedure becuase of the time saved in performing an analysis. On av., 5-6 samples h^{-1} can be analysed by A.C. VP including time required to polish the electrode. At concn. of SO_2 below 4 mgl^{-1}, the precision in the A.C. technique (5%) is better. BV

Non-alcoholic beverages

1780
Manjunath (MN), Sattigert (VD) and Nagaraja (KV). **Thin layer chromatographic method for the detection of caffeine in non-alcoholic beverages.** *Indian Food Packer* 47(2): 1993: 51-52

Min. detectable quantity of caffeine by TLC method in non-alcoholic beverages viz. 25 µg was ascertained using varying concn. of caffeine. Caffeine could be detected by the characteristic pinkish-red spot at R_f around 0.80 on the chromatoplate. Hydrogen peroxide and chloramine-T in presence of HCl oxidized caffeine gave pinkish-red compound. Detection of caffeine in cola and cola-type beverages was effective by TLC method. The commonly present additives like benzoic acid and saccharin did not interfere with the detection of caffeine. GS

1781
Lau (O-W), Luk (S-F), Cheng (O-M) and Chiu (TPY). **Background-correction methods for the determination of caffeine in beverages, coffee and tea by using second-derivative ultraviolet spectrophotometry.** *Analyst (London)* 117(4): 1992: 777-783

Background-correction methods have been developed for the detn. of caffeine in beverages, coffee and tea by second-derivative ultraviolet spectrophotometry. The second derivatives of

caffeine were measured at 298.6 nm. Interference from tannins in beverages and tea was minimized by treating the sample with 0.1 mol dm^{-3} sodium hydroxide and by precipitating tannins with Cu (II) acetate, respectively. Coffee samples were treated with sodium hydroxide (0.25 - 0.75 mmol dm^{-3}). The calibration graphs for the three types of sample had slightly different slopes (0.00146 - 0.00152 A nm^{-2} $p.p.m.^{-1}$) and linear ranges. The precision for the detn. ranged from 0.3 to 0.9%, at the 10 µg ml^{-1} level of caffeine. A number of cola drinks, energy drinks, lemon tea drinks, coffee samples and tea samples were analysed. AA

Coffee

1782

Robin stainer. **World bank forecasts long-term rise in real coffee price.** *Indian Coffee* 42(6): 1993: 27-30

Review gives data on coffee price projections, index of total inventories of green coffee in International Coffee Organization importing members, prices of roasted coffee in selected countries and world coffee market projection from 1992. SRA

Fruit juices

1783

Backheet (EY), Emara (KM), Askal (HF) and Saleh (GA). **Selective spectrophotometric method for the determination of ascorbic acid in pharmaceutical preparations and fresh fruit juices.** *Analyst (London)* 116(8): 1991: 861-865

A simple, rapid, sensitive and selective method for the spectrophotometric detn. of ascrobic acid in pharmaceutical products and also in fresh fruit juices without interference from coloured and other substances present in the fruit extracts is described in this paper. The procedure is based on the reaction of AA with the zinc chloride salt of diazotized 1-aminoanthraquinone (Fast Red Al salt) in an acidic medium, followed by development of a blue colour (λ_{max} 630 nm) in alkaline sol. The method was used to determine between 5 and 25 µg ml^{-1} of AA in the final sol. The simplicity of the method permits rapid analysis, suitable for routine control. BV

FATS AND OILS

1784

Raharjo (S), Sofos (JN) and Schmidt (GR). **Solid-phase acid extraction improves thiobarbituric acid method to determine lipid oxidation.** *Journal of Food Science* 58(4): 1993: 921-924, 932

Samples (110g) of raw (17.2 - 22.6% fat) and cooked (12.6 - 16.4% fat) ground beef in plastic cups were stored aerobically at 4 plus or minus 1°C. Lipid oxidation was measured by 4 versions of the thiobarbituric acid (TBA) test, including aqueous acid extraction-C_{18} (TBA-C_{18}), direct heating, distillation, and unmodified aqueous acid extraction; and by sensory evaluation of rancid odour after 0, 2, 4, 6, and 8 days storage. The TBA-C_{18} method was more specific ($P < 0.05$) and its limit of detn. was 20 times lower than the other methods in detecting malonaldehyde. Results correlated ($r = 0.856$ to 0.883 in raw, and $r = 0.936$ to 0.981 in cooked meat) with sensory evalaution scores. AA

Fats

1785

Sargi (L), Prognon (P), Mahuzier (G), Cepeda (A), Vazquez (ML), Blais (J), Bisagni (E). **Sensitizers for the room temperature phosphorescence of biacetyl in fats.** *Analyst (London)* 116(2): 1991: 159-164

The detn. of the biacetyl concn. in fats can be achieved by measuring the phosphorescence emmision of biacetyl at room temp. The biacetyl phosphorescence can be sensitized using suitable donors by means of a triplet-triplet energy transfer. The spectroscopic characteristics of 4 newly synthesized coumarin derivatives, which are soluble in non-polar solvents, have been studied. In order to determine whether a triplet-triplet energy transfer is possible, the energy of the lowest triplet state of these derivatives was determined by using phosphorescence spectroscopy. Their ability to sensitize the biacetyl phosphorescence has been investigated and the 6,7-dihydro-3-ethoxycarbonylpsoralen appeared to be the best sensitizer. In this instance, a biacetyl concn. as low as 0.05 p.p.b. (µg kg^{-1}) can be determined in butter samples. AA

Oils

1786

Ramakrishna (G), Lakshminarayana (T) and Azeemoddin (G). **Processing of tumba (*Citrullus colocynthis*) seeds and oil.** *Journal of the Oil Technologists Association of India* 25(1): 1993: 3-5

Pilot plant cleaning and dehulling, cooking and expelling of tumba (*C. colocynthis* Schard) seed, and refining and bleaching expelled or solvent extracted

seed oil are discussed. Tumba seed oil is edible since its composition is somewhat similar to soybean oil, and its bitter taste is removed by refining and washing with citric acid. GS

1787

Kedar Prasad Singh. **Challenges and opportunities in essential oil processing industries.** *Research and Industry, India* 38(2): 1993: 83-89

Information pertaining to sources of various essential oils and their important chemical constituents is presented. Salient features of existing and incoming technologies pertaining to essential oil processing industries are highlighted. Water distillation, steam distillation, cohobation, solvent extraction, maceration and enfleurage are the most common method, enfleurage being the oldest among all. Maceration is adaptable where oil yield from distillation is poor. Distillation methods are good for powdered almonds, rose petals, rose blossoms, whereas extraction is suitable for high priced, delicate and thermally unstable perfumery materials like jasmine, tuberose, hyacinth, violet etc. Water distillation is most favoured method of production of citronella oil from plant material. Super critical fluid extraction and microwave extraction are the most recent and potentially promising methods of production of essential oils from natural products. AA

1788

Bhattacharyya (DK). **Towards self sufficiency in edible oils in India.** *Science and Culture* 58(1/2): 1992: 1-3

The requirement of oilseeds and edible oils in India for the future years, the continuance of the current cultivation practice for the major oilseeds, the max. exploitation of minor oilseeds and byproduct sources, the extensive palm and coconut plantations, the adaptation of the biotechnological routes of production of oilseeds and microbial oils, the adaptation of the modern technologies for processing of oilseeds and oils; and the maintenance of proper price structure are outlined. GS

1789

Sajid Husain, Mohd. Kifauatullah., Sastry (GSR) and Prasada Raju (N). **An alternate method for detection and determination of linolenic acid in vegetable and heat abused oils by ^{13}C NMR spectroscopy.** *Journal of the Oil Technologists Association of India* 25(2): 1992: 35-38

Terminal methyl carbon region (TMCR) in ^{13}C NMR spectra of long chain fatty acids can be used to recognise and determine the linolenic acid (LA) in oils, heated oils and mixed fatty acids. Quantitative integrity and detection sensitivity of LA was compared with definic region of the ^{13}C NMR spectra and with ^{14}spectra. Large discrepencies in LA content between GLC and olefinic ^{13}C NMR methods were seen. This was done to the application of relatively less pulse delay time (25 s) as compared with 45 s in olefinic signals of LA. GS

1790

Kittur (MH), Mahajanshetti (CS) and Lakshminarayana (G). **Characteristics and composition of *Trichosanthes bracteata*, *Urena sinuata* and *Capparis divaricata* seeds and oils.** *Journal of the Oil Technologists Association of India* 25(2): 1993: 39-41

The seeds of *Trichosanthes bracteata*, Viogt. syn., *T. palmata*, Roxb. (Curcubitaceae). *Urena sinuata*, Linn. (Malvaceae) and *Capparis divaricata*, Lam. syn., *C. stylosa*, DC (Capparidaceae) contained 31.6, 6.8 and 4.2% oil; and 18.8, 22.7 and 47.1% protein, respectively. The fatty acid composition (wt. %) was determined by GLC. Unusual fatty acids-punicic acid (41.8%) in *T. bracteata*: malvalic acid (2.4%), sterculic acid (2.1%), dihydromalvalic acid (0.5%) and dihydrosterculic acid (1.2%) in *U. sinuata*; and malmitoleic acid (9.8%) in *C. divaricata* seed oils were present. AA

Groundnut oils

1791

Toliwal (SD), Lokhande (AR), Raval (DA) and Kulkarni (AS). **Chemical composition of oils from some varieties of groundnut (*Arachis hypogaea*).** *Journal of the Oil Technologists Association of India* 25(2): 1993: 31-33

Chemical characteristics, fatty acids compositions, nutritional quality index and the oil stability index of 10 var. of groundnut oils were analysed. Var. Somnath had oil content of 50.7% (highest); GG-11 48.4%, ICGS (FDRS)-4 45.7% and VRI-2 36.8% (lowest). Other var. ICGS 44, ICGS 1, GAUG 10, GG2, ICGS 37 and ICGS 11 had the oil content in the range of 37.49 - 44.3%. The main fatty acids were palmitic, stearic, oleic and linoleic. The nutritional quality indices of the oils ranged between 0.64 to 1.91. Var. ICGS-1 had the highest nutritional quality index. Var. GAUG-10 showed the highest keeping quality due to the highest oleic acid content. GS

Niger oils

1792

Dasthagiriah (P) and Nagaraj (G). **Seed and oil quality characteristics of some niger genotypes.**

Journal of the Oil Technologists Association of India 25(2): 1992: 42-44

Fourteen niger genotypes were analysed for seed oil and protein content and oil quality including its fatty acid composition. The observed ranges were oil, 36.6-38%; protein, 21.0-30%; oil yield/ha 60-436 kg; protein yield/ha, 38-260 kg; linoleic acid content of oil, 75-78%; IV of oil, 137-141 and nutritional quality index, 4.5-5.3. The oil and protein yields closely followed the pattern of seed yield. AA

Palm oils

1793

Saleh (MI), Jab (MS), Rahman (IAb) and Norasiah (S). **Aqueous extraction of copper and iron from palm oil by ultrasonic cavitation.** *Analyst (London)* 116(7): 1991: 743-745

A method for the extraction of Cu and Fe from palm oil into an aqueous sol. using a 20 kHz ultrasonic probe is described in this article. The acidic aqueous phase was separated from the organic phase through a filter-paper after agitation. The optimum conditions for the extraction were a power of 200 W and an agitation time of 4 min with 1.00 mol dm^{-3} HNO_3. A recovery of approx. 98% of 4 p.p.m. Cu and Fe from the spiked samples was achieved with a precision of < 2% relative standard deviation. The application of the method is limited to the liquid form of the oil (palm olein). The method is not applicable to the solid portion (palm stearin). BV

Rice bran oils

1794

Ajit Joshi, Subrahmanyam (VVR) and Momin (SA). **Margarine bases from rice bran oil.** *Journal of the Oil Technologists Association of India* 25(1): 1993: 7-9

The possibility of making margarines/spreads, using rice bran oil as the liquid component and hydrogenated rice bran oil as the solid component, is assessed. Using rice bran oil as the single source of fat base yielded good quality margarines/spreads, because of the partially hydrogenated rice bran oil formed stable 'B' type crystals since it contained about 2% myristic and 20% palmitic acids, the rest C_{18} acids. GS

1795

Ajit Joshi, Subrahmanyam (VVR) and Momin (SA). **Blends of triglycerides and monohydric alcohol esters from rice bran oil.** *Journal of the Oil Technologists Association of India* 25(1): 1993: 15-17

Degummed high FFA rice bran oil was esterified with monohydric alcohols like 1-octanol and 2-ethyl hexanol in presence of acid catalyst which resulted in a mixture of triglycerides and monohydric alcohol esters. These ester containing oils - 'ester-oils' - were subjected to reactions of epoxidation, sulfurization and sulfation, and the products obtained were found to give satisfactory performance as secondary plasticizers for PVC, additives for lubricants and fat liquoring agents for leather, respectively. AA

1796

Ajit Joshi, Subrahmanyam (VVR) and Momin (SA). **Interesterified rice bran oil products for margarines.** *Journal of the Oil Technologists Association of India* 25(2): 1993: 27-29

Use of rice bran oil as the sole base oil for making zero trans margarines was studied. Blends of hydrogenated fat ($H_{58.5}$ with refined rice bran oil (RBO) having IV of 101.8, saponifiable matter content of 2.7% were prepared and their physical properties determined. All the simple blends showed higher slip point (SP) than butter fat (BF, 34.0°C) but were softer than BF due to large % of liquid glycerides present in the blends. Margarine of interesterified product of blend having 25% $H_{58.5}$ showed SP and drop point (DP) closer to those of reconstituted BF. Margarine made from interesterified products do not have trans isomers and large amount of liquid oil (RBO) can be incorporated in them. They are better and cheaper than butter since they provide essential fatty acids. GS

SPICES AND CONDIMENTS

Essential oils

1797

Sud (RG) and Badyal (JM). **Utilization of citrus rind for peel oil: Stage of fruit and evaluation of methods.** *Indian Food Packer* 47(4): 1993: 45-48

Peel oil from citrus cv. Orange, Kinnow, Cleopatra mandrin, Hill lemon and Kagzi lime were extracted by subjecting the rind to 4 different treatments: drying of peel; unruptured peel; rupturing flavedo with needles; and cold press followed by immersion in hot water bath. Yield of peel oil was lowest at the initial stage, but increased as the season advanced and highest towards the end of sampling period. Max. yield was 2.05 ml/100g peel in Orange followed by Cleopatra and Kinnow mandrin. Cold press treatment was found to be the best. GS

Spices

1798

Shashidaran (CK). **Flexible packaging media for spices.** *Packaging India* 25(6): 1993: 5, 7, 9, 11-13, 15, 17

Various aspects covered in this article are the packaging requirements of spices: the process, properties and applications of various co-extruded multilayer films such as LDPE, EVA, HDPE, LLDPE, ionomers/acrylic acid copolymers, nylon and EVOH: the properties and application of barrier films for spices (polyester film), biaxially oriented polypropylene film (BOPP film), co-extruded heat sealable BOPP film, pearlised biaxially-oriented polypropylene films): various laminates (adhesive lamination, extrusion lamination, extrusion coating lamination): types of laminates, types of pouches and costing of pouches. CSA

Olives

1799

Montano (A), Sanchez (AH) and De Castro (A). **Controlled fermentation of Spanish-type green olives.** *Journal of Food Science* 58(4): 1993: 842-844, 852

Pure culture fermentation of Spanish-type green olives was developed. The method used no heat treatment, included chlorination of both fermentor and olives, used sterile lye, water and brine, and acidification with lactic acid before inoculation. *Lactobacillus plantarum* was used as test species. After 34 days fermentation, citric acid, manitol and malic acid were completely degraded and approx. 90% of available glucose and fructose, but < 30% sucrose, were utilized. Fermentation products were D- and L-lactic acid, ethanol, succinic, and acetic acid with a calculated carbon recovery of 107.5%. D-lactic predominated over L-lactic acid. No differences were found between flavour of pure culture and naturally fermented olives, but there was a tendency towards preference of the latter. AA

Peppers

1800

Thomas (PP) and Gopalakrishnan (N). **A process for the production of unwrinkled dry ball shaped green pepper.** *Indian Spices* 29(4): 1992: 9-10

Process developed at Regional Res. Lab., Trivandrum, India, for the production of dehydrated green pepper without wrinkles on the skin involves despiking, cleaning, washing, blanching in boiled water, conditioning, drying and packing. Pepper processed has ball shape, crisp, green in dry form and almost original green when rehydrated, moisture content 5.3% on dry wt. basis, 0.034% chlorophyll content on dry wt. basis, and 4% volatile content. Samples stored in plastic containers for 8 months showed enhanced appearance in dry form as well as after reconstitution with water and had the natural fresh look. SRA

Tamarind

1801

Achoba (II), Lori (JA), Elegbede (JA) and Kagbu (JA). **Nutrient composition of black (African) velvet tamarind (*Dialium guineense* Wild) seed and pulp from Nigeria.** *Journal of Food Biochemistry* 16(4): 1993: 229-233

The nutritional potential of the black (African) velvet tamarind fruit is highlighted. Analysis for proximate composition, selected inorganic ions and vitamin C showed significant differences in the values (%) of moisture (5.9 and 4.9), organic matter (97.5 and 98.5), crude protein (15.7 and 4.2), crude fat (5.4 and 2.6), dry matter (94.1 and 95.1), ash (2.5 and 1.8), total carbohydrates (70.6 and 86.6) and crude fibre (6.6 and 2.2) for seed and pulp, respectively. The ascrobic acid content was higher in the pulp (35.7 mg/100 g) than in the seed (6.4 mg/100g). The black velvet tamarind is a good source of nutrients for human food. GS

SENSORY EVALUATION

1802

Rao (MA) and Cooley (HJ). **Dynamic rheological measurement of structure development in high-methoxyl pectin/fructose gels.** *Journal of Food Science* 58(4): 1993: 876-879

Incipient structure development (SD) in 65% fructose - 0.5, 0.75 and 1% high-methoxyl (HM) pectin gels (pH 2.7) being cooled (50-10°C) were measured in terms of dynamic viscosity (v^*) at 1Hz. SD rates (poise/min) were higher at lower temp., higher pectin concn., and when pectin was hydrated for 16 h. Below the gel temp., SD rates in 1% gel followed the Flory-Weaver model. SD in stored 0.5% gels during 22 days was strongly affected by storage temp. (2 - 38°C) and pH. SD rates in pH 2.7 gels were positive above, but negative below 18°C. AA

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

1803

Agrawal (RK), Jaya Raj (K), Chhawara (SK) and Sanjeeva (S). **Relative efficacy of newer insecticides in comparison to malathion against stored grain insect pests.** *Bulletin of Grain Technology* 30(1): 1992: 68-72

Relative efficacy of deltamethrin (K-othrine 2.5 WP) and fenitrothion 50 EC was evaluated in comparison to malathion 50 EC against *Tribolium castaneum* and *Oryzaephilus surinamensis* at FCI Depot, Cherlapalli, Hyderabad. Malathion and fenitrothion applied at 150 mg a.i./m^2 on bags, alleyways and walls lost their effect after 7 days while deltamethrin applied at 30 mg a.i./m^2 on the above surfaces remained effective up to 75 days. AA

1804

Rajendran (S). **Status of research on stored product insects resistant to insecticides and fumigants in India.** *Bulletin of Grain Technology* 30(1): 1992: 73-81

Information on research in India involving insecticide and fumigant resistant strains like lab. selctions, inheritance of resistance, cross-resistance tests, biochemical investigations and studies examining the biological characteristics is reviewed. 64 references. GS

1805

Nawale (RN), Patil (RK) and Mote (UN). **Use of synthetic pyrethroids as protectants of pigeonpea seed against pulse beetle, *Callosobruchus maculatus* (F.).** *Bulletin of Grain Technology* 30(1): 1992: 88-90

Efficacy of synthetic pyrethroids - cypermethrin, permethrin, cyfloxylate, decamethrin, fenvalerate, malathion, as seed protectants in pigeon pea (*Cajanus cajan* Linn) against pulse beetle (*C. maculatus* F.) were studied. Treatment with malathion (75 p.p.m.) was the most effective amongst all insecticides tested. Decamethrin (12.5 p.p.m.) cyfloxylate (150 p.p.m.), fenvalerate (75 p.p.m.) and cypermethrin (20 p.p.m.) did not cause any loss in grain wt. GS

BIOCHEMISTRY AND NUTRITION

1806

Du (Z) and Bramlage (WJ). **Malondialdehyde oxidation by hydrogen peroxide and by light-excited riboflavin in model systems.** *Journal of Food Science* 58(4): 1993: 925-928, 932

Oxidation of malondialdehyde (MDA) by H_2O_2 was affected by concn. of MDA or H_2O_2, pH and solvent. The reaction displayed an approximate 1:1 ratio of H_2O_2/MDA consumption and probably produced malonadlehyde as the oxidation product in moderate conditions. Oxidation of MDA by light-excited riboflavin produced superoxide anion. and the amount of superoxide anion generated was MDA concn.-dependent. AA

TOXICOLOGY

1807

Medeiros (LC), Belden (RP) and Williams (ES). **Selenium content of bison, elk and mule deer.** *Journal of Food Science* 58(4): 1993: 731-733

Bison, elk and mule deer meat did not differ in (Se) content but contained more Se than beef(wet wt.) ($P < 0.05$) on dry wt. basis, deer meat contained more Se than elk, bison or beef ($P < 0.05$). GS

1808

Scarlett (T). **Quantitative risk assessment, food chemicals and a healthy diet.** *Food Reviews International* 8(2): 1992: 277-300

This article describes the risk assessment procedures used by Federal Agencies, and how and why they are used. Also discusses whether a similar approach is possible, or useful, for quantifying the health risks and benefits from dietary factors. 96 references. BV

FOOD LAWS AND REGULATIONS

1809

Kapoor (BL). **The Indian food standards under PFA and FPO relating to fruit and vegetable products - anomalies and problems.** *Indian Food Packer* 47(4): 1993: 39-43

Listing out the conspicuous anomalies in Indian Food Standards under PFA and FPO prescribed for fruit juice, tomato juice, soybean sauce, fruit syrup, fruit squash, fruit drinks, tomato sauce, jams, marmalades, fruit chutney, sauce, tomato puree/paste, spice based sauce, pickles in vinegar, pickles in citric juice or brine and pickles in oil. Health Ministry is appealed to rectify them and support the agro-based industries. GS

AUTHOR INDEX

Cherian (S)
1650
Chhawara (SK)
1803
Chin (H-W)
1671
Chiu (TPY)
1781
Chowdhury (AR)
1647
Chua (RS)
1685
Chung (OK)
1704
Chung (SL)
1771
Cifuentes (A)
1766
Clarke (AD)
1758
Clyne (J)
1632
Collins (JL)
1645
Cooley (HJ)
1802
Coutaz (VR)
1666
Cromie (S)
1724
Das (S)
1705
Dasthagiriah (P)
1792
Dautil (EN)
1605
Dave (JM)
1717 1718
Dave (RI)
1717 1718
Davey (KR)
1744 1750
Davis (CE)
1740
De Castro (A)
1799
Decker (EA)
1759
Deepa Pande
1714 1715
Desai (HK)
1732
Desrosiers (T)
1773
Dharam Pal
1733
Diefes (HA)
1727
Dionysius (DA)
1764
Diosady (LL)
1634
Dodeja (AK)
1733
Doharey (RB)
1639
Dondero (M)
1766
Doraisamy (P)
1689
Du (Z)
1806
Egana (W)
1766
Eilert (SJ)
1745
Eitenmiller (RR)
1769
Elegbede (JA)
1801
Emara (KM)
1783
Erickson (MC)
1768
Fioreze (R)
1664
Fleet (GH)
1659 1660
Fleming (HP)
1669 1673
Flores (NC)
1758
Foegeding (EA)
1737 1757
Fujio (Y)
1654 1658
Furusawa (M)
1735
Furuta (S)
1654
Gangopadhyay (SK)
1657
Garrote (RL)
1666
Geiger (PJ)
1620
Gekas (V)
1667
Ghatak (PK)
1713
Giese (J)
1607
Giese (JH)
1778
Godber (JS)
1739
Gonzalez (AR)
1690
Gopakumar (K)
1763
Gopal Rao (B)
1625
Gopalakrishnan (N)
1800
Goyal (RK)
1639
Gratzek (JP)
1615
Gray (R)
1754
Gregory (JFIII)
1619
Gunathilagaraj (K)
1665
Gupta (HK)
1613
Gupta (RC)
1647
Guraya (HS)
1696
Gurusharan Singh
1633
Hamada (S)
1755
Hamilton (IC)
1779
Han (D)
1739
Hanumantha Rao (GV)
1674
Harnail Singh
1633
Harper (SJ)
1621
Harrington (RE)
1629
Hart (LT)
1739
Hattori (M)
1742
Hayakawa (I)
1654 1658
Hayakawa (K-I)
1695
Hayashi (M)
1710
Hayashi (N)
1658
Haynes (I)
1722
Heymann (H)
1720
Hiraoka (J)
1755
Hoek (KS)
1764
Hohno (H)
1735
Holdt (CS)
1656

Holt (DL)
1720
Horikoshi (T)
1755
Hsieh (FH)
1758
Huang (YW)
1769
Huff (EJ)
1747
Hull (R)
1722
Hung (TV)
1642
Ilori (MO)
1765
Imai (C)
1770
Ito (O)
1710
Ivkovich (M)
1712
Jab (MS)
1793
Jain (VK)
1697
Jain (YD)
1612
Jana (AH)
1736
Jaya Raj (K)
1803
Jayachandran (P)
1761
Jenkins (RK)
1752
Joia (BS)
1630
Joshi (BC)
1636
Joshi (CD)
1675
Joshi (N)
1627
Judge (BK)
1630
Juneja (LR)
1756
Kadam (SS)
1684
Kagbu (JA)
1801
Kalia (M)
1672
Kaloo (G)
1663
Kamata (S)
1710
Kanawjia (SK)
1626 1728 1729
Kanekar (P)
1627
Kanjilal (SC)
1641
Kanwajia (SK)
1721
Kapoor (BL)
1809
Kapse (BM)
1676
Karel (M)
1624
Katara (RV)
1730
Kawabata (M)
1770
Kedar Prasad Singh
1787
Kenani (MA)
1668
Kesava Rao (V)
1738
Khan (S)
1713
Khandekar (RG)
1675
Kim (HS)
1704
Kim (M)
1756
Kitagawa (M)
1608
Kittur (MH)
1790
Kochhar (APS)
1680
Koehler (PE)
1769
Koketsu (M)
1756
Kondo (T)
1693
Kotecha (PM)
1684
Kowale (BN)
1738
Krishnamurthy (MM)
1631
Krochta (JM)
1622 1623
Kulkarni (AS)
1791
Kurien (PP)
1646
Kwok (KC)
1655
Lowe (TE)
1772
Ladhabhoy (AE)
1682
Lakshmi (RVS)
1702
Lakshminarayana (G)
1790
Lakshminarayana (T)
1786
Lal (J)
1636
Lamberg (I)
1667
Lanari (MC)
1746 1749
Latha Sabikhi
1721 1728 1729
Lau (O-W)
1781
Lavelle (CL)
1757
Lavigne (C)
1773
Le Maguer (M)
1628 1694
Lee (CM)
1767
Lehmann (F)
1722
Lehmann (FL)
1723
Li (BW)
1638
Light (A)
1720
Lillard (DA)
1769
Limsowtin (G)
1725
Lindsay (RC)
1671
Littell (RC)
1619
Liu (LH)
1642
Lokhande (AR)
1791
Lori (JA)
1801
Lotan Singh
1706
Lovell-Smith (JER)
1708
Lovett (DA)
1750
Luk (S-F)
1781
Luna (JA)
1666
Lundy (A)
1711
Lynch (JA)
1760

Macfie (HJH)
1760
Mahajanshetti (CS)
1790
Mahuzier (G)
1785
Majumdar (SK)
1635
Malik (RK)
1726
Malika (RK)
1716
Mandigo (RW)
1745
Manjunath (MN)
1780
Mariath (MMR)
1664
Marinos-kouris (D)
1681
Marshall (DL)
1739
Mathews (RF)
1619
Mathur (BN)
1774 1775 1776
Mathur (DK)
1716 1726
Mathur (MP)
1714 1715
Mathur (P)
1606
Matsuura (F)
1756
Mayuravalli (VVL)
1631
McCalley (DV)
1688
McCord (JD)
1653
McDaniel (MR)
1621
McEvily (AJ)
1679
McFeeters (RF)
1669 1673
McHugh (TH)
1622
McMillin (KW)
1739
Mead (GC)
1760
Medeiros (LC)
1807
Mehrotra (NN)
1606
Merritt (JH)
1771
Michel (I)
1773
Milne (JM)
1764
Miltz (J)
1618
Minegishi (Y)
1770
Mitchell (JK)
1690
Mohan Doss (S)
1698
Mohd Kifauatullah
1789
Mokashi (NG)
1610
Momin (SA)
1794 1795 1796
Monsalve-Gonzalez (A)
1679
Montano (A)
1799
Montelongo (J-L)
1653
Mori (T)
1693
Morrison (WR)
1632
Mote (UN)
1805
Mulekar (VC)
1676
Mulet (A)
1691
Mulyowidarso (RK)
1659 1660
Nadanasabapathi (S)
1687 1698
Nagaraj (G)
1792
Nagaraja (KV)
1651 1780
Naik (DM)
1676
Nair (KC)
1650
Nakazawa (Y)
1735
Narayana Swamy (M)
1651
Narian (N)
1664
Nasir Ahmed (S)
1699
Nataraju (S)
1687
Nawale (RN)
1805
Nguyen-The (C)
1662
Norasiah (S)
1793
Nusrath Nasir
1651
Ofoli (RY)
1668
Ohta (M)
1756
Oishi (H)
1735
Oste (R)
1667
Pal (MA)
1734
Palanivel (A)
1661
Pampapathy (K)
1674
Paneras (ED)
1751
Paramasivam (K)
1652
Pareek (OP)
1678
Parrish (FCJr)
1747
Part (C)
1741
Patel (JR)
1718
Patil (RK)
1805
Paul (SC)
1774 1775 1776
Piggott (JR)
1632
Pillet-Nill (T)
1617
Prajapati (PS)
1731
Prajapati (SK)
1636
Prasad (G)
1689
Prasada Raju (N)
1789
Pratap (PS)
1663
Pratape (VM)
1646
Prema Viswanath
1651
Prognon (P)
1785
Qin (WH)
1655
Queguiner (C)
1608
Radha Iyengar
1679
Raharjo (S)
1784

Rahman (IAb)
1793
Rajasekaran (S)
1699
Rajendran (S)
1804
Rajukkannu (K)
1689
Ram Kumar
1697
Rama Murthy (MK)
1719
Ramakrishna (G)
1786
Ramakrishnaiah (N)
1646
Ramanathan (G)
1661
Ramaswamy (HS)
1617
Ramshaw (C)
1609
Ramzan (M)
1630
Ranote (PS)
1686
Rao (KH)
1721
Rao (MA)
1802
Rathi (SD)
1703
Rathna Kumar (K)
1761
Raval (DA)
1791
Ravi (P)
1614
Reddy (GPV)
1631
Renerre (M)
1743
Reynolds (J)
1711
Rincon (F)
1645
Rizvi (SSH)
1709 1727
Robin Stainer
1782
Roos (Y)
1624
Ros (G)
1645
Rossello (C)
1691
Rousset (S)
1743
Roy (SK)
1683
Roychoudhury (R)
1685
Ryder (JM)
1772
Saini (SPS)
1686
Saito (M)
1755
Sajid Husain
1789
Sakurai (M)
1693
Saleem Sajid (A)
1697
Saleh (GA)
1783
Saleh (MI)
1793
Sanchez (AH)
1799
Sandhu (JS)
1651
Sanjeeva (S)
1803
Sanju Garg
1626
Sannabhadti (SS)
1717 1718
Santhi (M)
1631
Sanyal (P)
1697
Sargi (L)
1785
Sarma (SC)
1733
Sastry (GSR)
1789
Sathe (SK)
1649
Sato (K)
1770
Sattigert (VD)
1780
Sawate (AR)
1703
Sawhney (IK)
1705
Saxena (MMS)
1700
Sayler (DF)
1620
Scarlett (T)
1808
Schaefer (DM)
1746
Schaefer (MJ)
1656
Scheller (KK)
1746
Schmidt (GR)
1784
Schmidt (K)
1711
Schwartz (SJ)
1670
Scollary (GR)
1779
Searcy (GK)
1740
Seetha (R)
1643
Sehgal (RC)
1648
Sehgal (VK)
1633
Seib (PA)
1704
Sharma (DK)
1625
Sharma (NK)
1625
Sharma (R)
1738
Sharma (S)
1678
Shasha (BS)
1692
Shashi Paul
1633
Shashidaran (CK)
1798
Shaw (A)
1606
Shehata (AME)
1640
Shelar (VR)
1637
Sherbon (JW)
1709
Shigeta (J-I)
1693
Shimizu (Y)
1770
Silva (ER)
1666
Simal (S)
1691
Singal (SK)
1644
Singh (BD)
1700
Singh (S)
1626 1721 1728
Singh (U)
1643
Sinha (NK)
1668
Slattery (SL)
1764

Sofos (JN)
1784
Soler (L)
1691
Sone Lal
1636 1639
Spanos (GA)
1670
Spencer (GF)
1692
Srivastsa (AN)
1687
Stevenson (MH)
1754
Stillman (JA)
1777
Subbaiah (K)
1677
Subrahmanyam (VVR)
1794 1795 1796
Subramanian (P)
1726
Sucheta (B)
1611 1612
Sud (RG)
1797
Sudama Singh
1700
Sugiyama (M)
1770
Surekha Kumari
1672
Surendra Nath (B)
1719
Suryanarayana Raju (G)
1635
Susheela (T)
1674
Syed (HM)
1703
Takahashi (K)
1742
Tarky (W)
1766
Teotia (MS)
1648
Thakar (PN)
1731
Thakur (HK)
1625
Thapar (VK)
1633
Thayer (DW)
1752
Thed (ST)
1768
Thomas (CK)
1706
Thomas (DR)
1616
Thomas (PP)
1800
Thompson (RL)
1673
Tiwari (GP)
1639
Toldra (F)
1741
Toledo (RT)
1615 1696
Toliwal (SD)
1791
Torres (JA)
1616 1766
Torres-Grifol (JF)
1688
Townsend (WE)
1740
Toyne (S)
1722
Trewhella (MA)
1642
Tsami (E)
1681
Tsang (JC)
1655
Tseng (DJ)
1619
Tsukamasa (Y)
1770
Upadhyay (KG)
1707 1731 1732 1736
Uploaksh (K)
1716
Uppal (SK)
1701
Usha (MA)
1719
Ushiyama (K)
1710
Vagenas (GK)
1681
Vaghela (MN)
1736
Vaidehi (MP)
1702
Varman (PV)
1652
Vaughn (SF)
1692
Vazquez (ML)
1785
Verma (BC)
1625
Verma (PS)
1700
Vijayalakshmi (NS)
1614
Visweswaraiah (K)
1635
Vyas (KK)
1680
Walter (WMJr)
1669
Wang (J)
1695
Waskar (DP)
1683
Wei (CI)
1619
Wells (RMG)
1772
Williams (ES)
1807
Wilson (RLJr)
1740
Xiong (YL)
1748 1753
Yadav (PL)
1734
Yamamoto (T)
1756
Yang (DC)
1628 1694
Yee (LN)
1711
Yoo (B)
1767
Yoshida (K)
1693
Younathan (MT)
1739
Zaritzky (NE)
1749
Zuckerman (H)
1618

DIRECTORY OF INDIAN FOOD MACHINERY AND PACKAGING EQUIPMENT

2nd Edition

(1993)

Central Food Technological Research Institute (CFTRI), Mysore, has now published the 2nd revised and enlarged edition of Directory of Indian Food Machinery and Packaging Equipment. It includes 912 alphabetically listed Machinery and equipment manufacturers, with their complete addresses. The second partof the Directory lists the manufacturers under different categories of equipment they manufacture. This 223-pa Directory is priced at Rs.300/- plus Rs.40/- for packing and forwarding. Copies will be despatched after the receipt of the Demand Draft drawn in favour of Director, CFTRI, Mysore, and forwarded to Head, FOSTIS, CFTRI, Mysore - 570 013. Copies also available at our Regional Centres in Hyderabad (Phone No. 854128), Mangalore (Phone No. 24304), Lucknow (Phone No. 382516), Ludhiana (Phobe No. 490568), Nagpur (Phone No. 534571), Bombay (Phone No. 6231599) and Liaison Office at Bangalore (Phone No 569931).

Regd. No. 36729/84

Printed and published by Director, Central Food Technological Research Institute, Mysore -570 013, at CFTRI Printing Press. Editor: Shri K. A. Ranganath, CFTRI, Mysore.